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CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

COVER STORY

Data Warehouse Game Plans

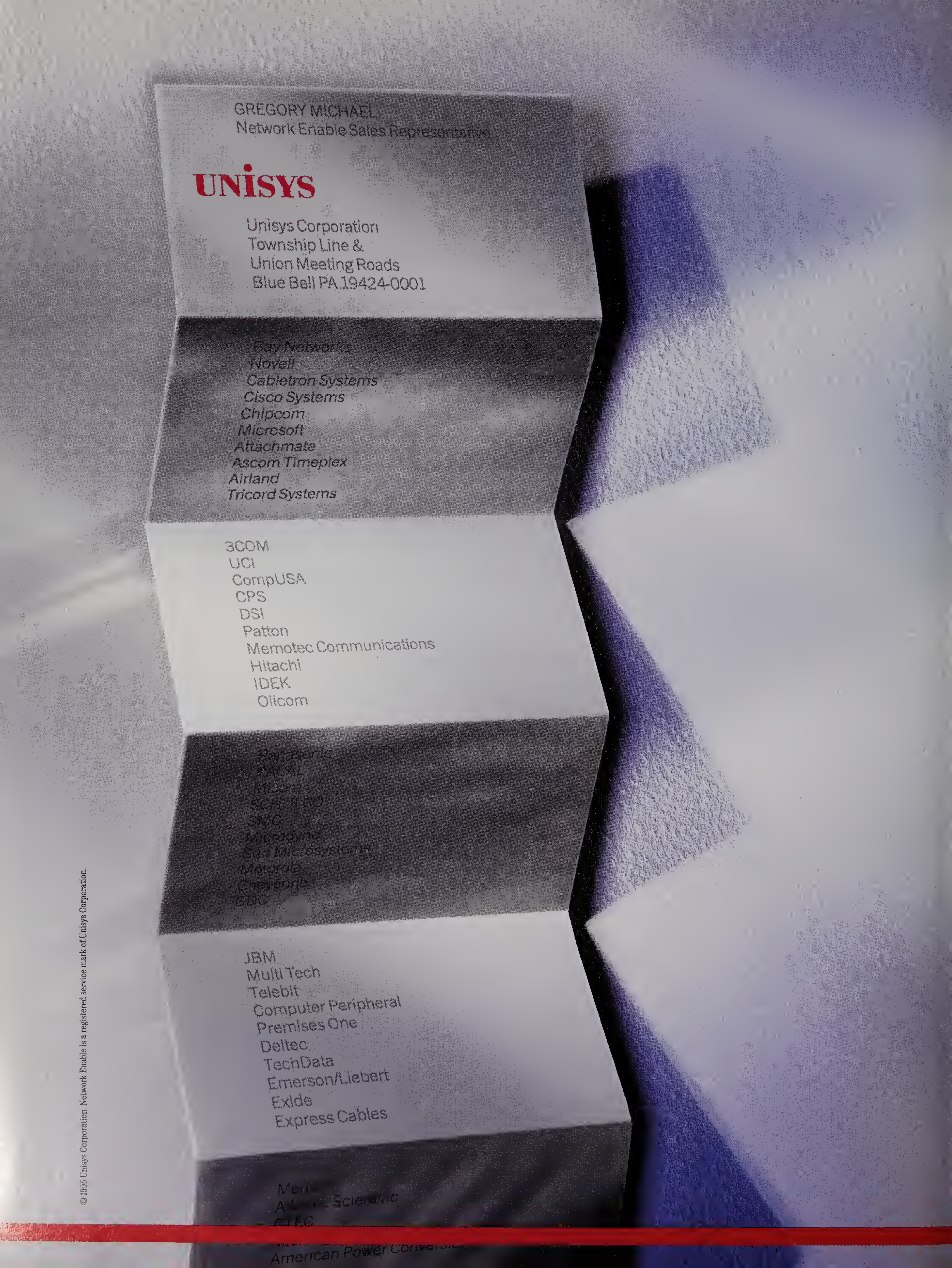
Developing A System Without Getting Fouled

ALSO INSIDE

The State of IS Benchmarking

Canadian Tire's David King

AN INTERNATIONAL DATA GROUP PUBLICATION



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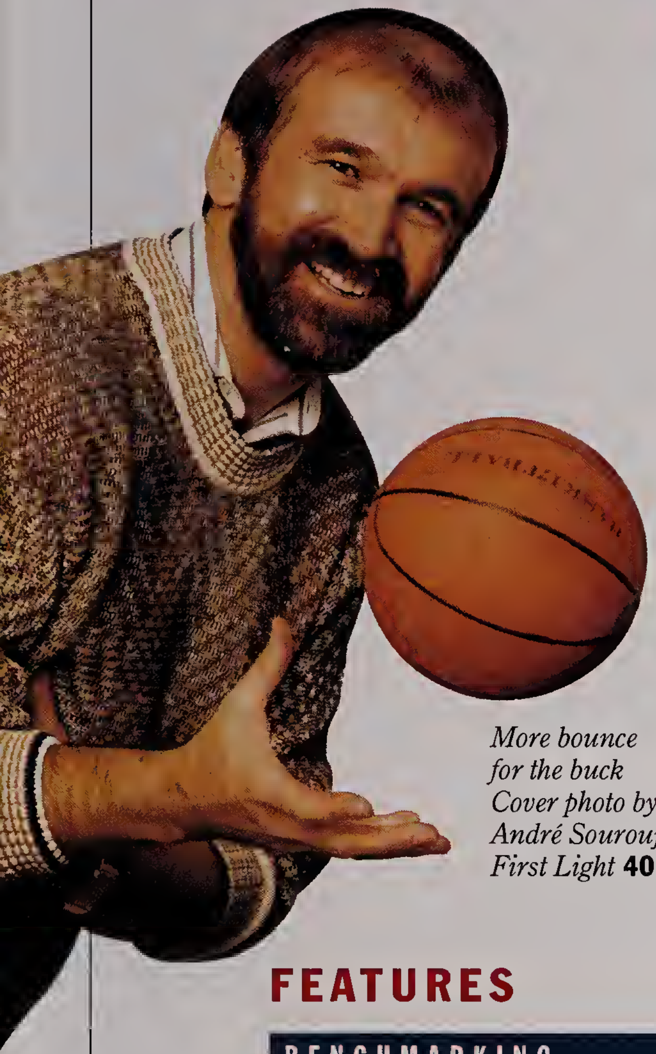
VOLUME 9, NUMBER 3



More bounce
for the buck
Cover photo by
André Souroujon/
First Light **40**

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DATA WAREHOUSES **40**

Form Follows Function

The construction of a data warehouse begins with careful attention to the overall architecture. The builders must figure out which data they want to access, in what form and how it will flow through the organization. The technology decisions should wait.

By Carol Hildebrand

Stacking
up against
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Benchmarking Comes of Age

Early adopters of benchmarking, along with more recent practitioners, offer insights on the current state (and future applications) of this maturing IT management tool.

By Richard Pastore

THE CIO ROLE **56**

Hired Guns

After an extensive search to hire a full-time CIO, many companies fail to locate the IS leader they need. During times of tumultuous transition, interim CIOs may be the answer.

By Peter Fabris

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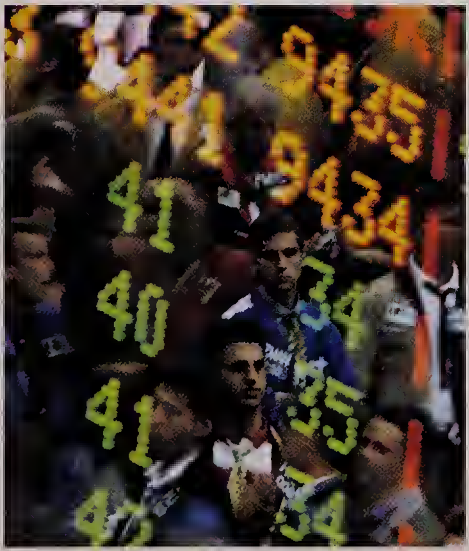

PARTNERSHIPS **66**

Exchange of Ideas

Blue-chip collaboration between IS and business executives at the Chicago Mercantile Exchange have earned the Merc a high rate of return—along with this year's Society for Information Management Partners in Leadership Award.

By Christopher Koch

Making
the trade
66

MORE ►►►

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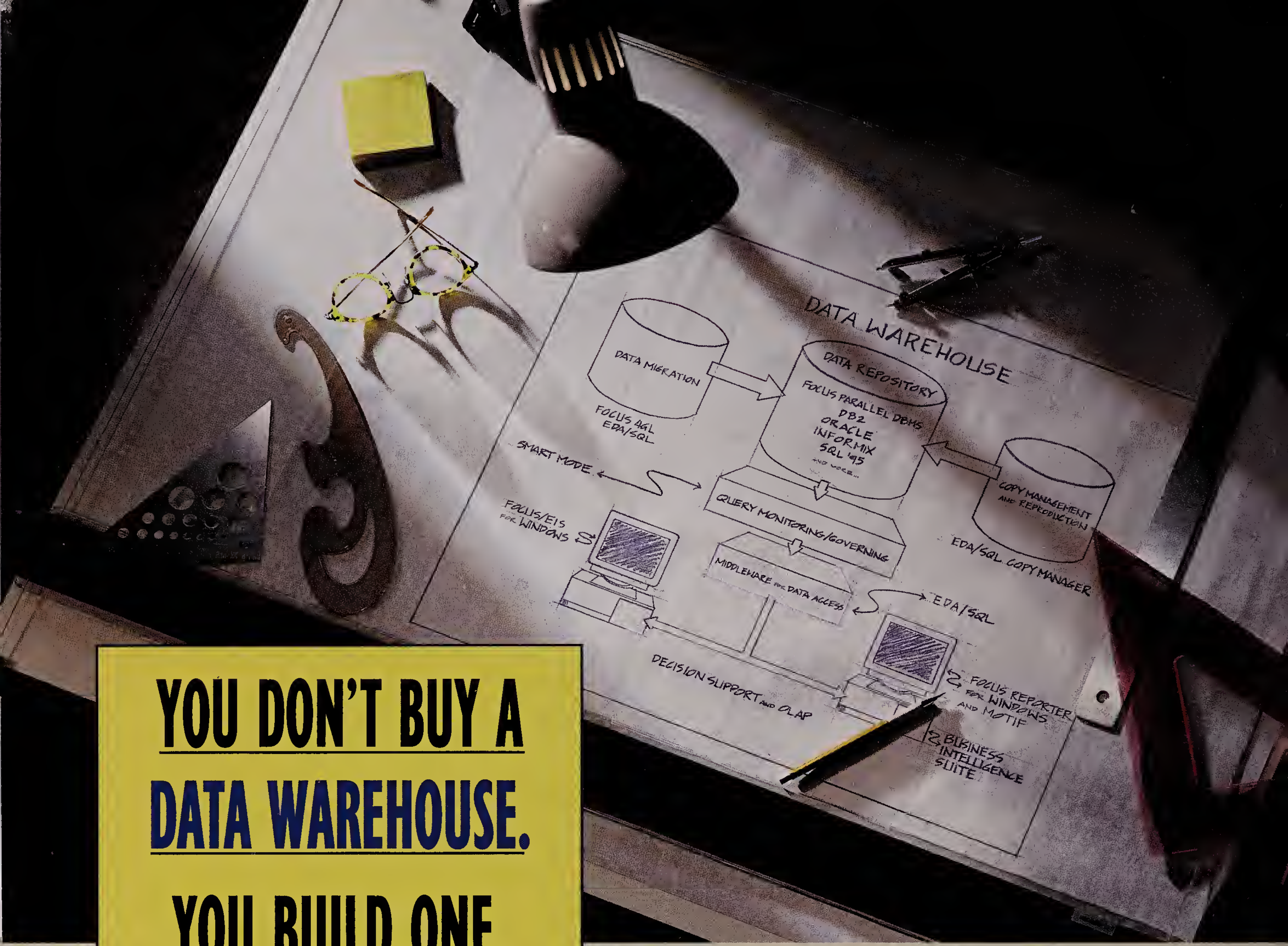
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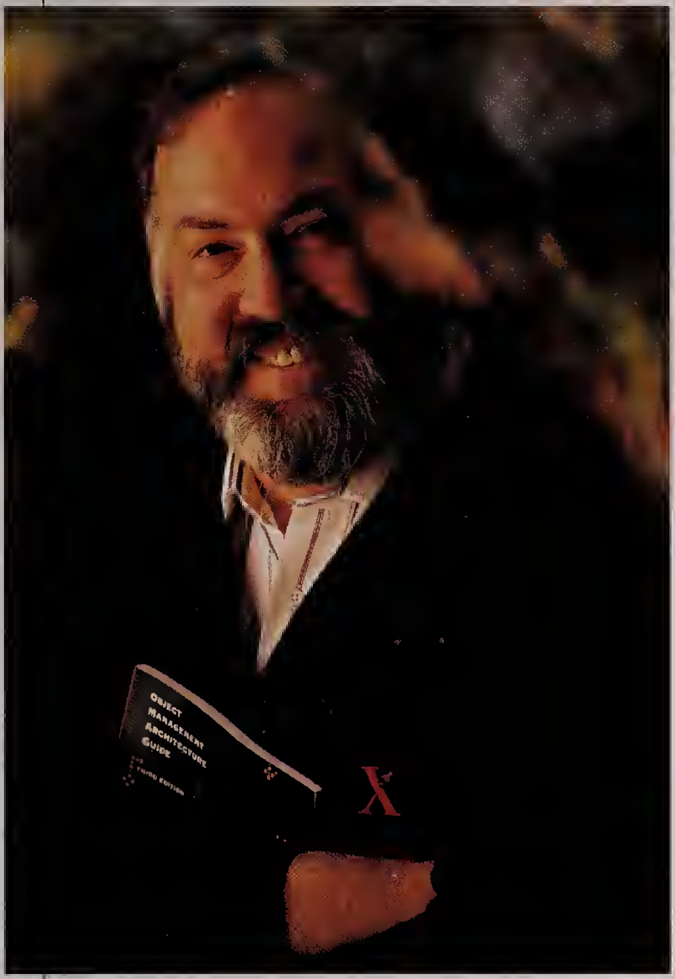

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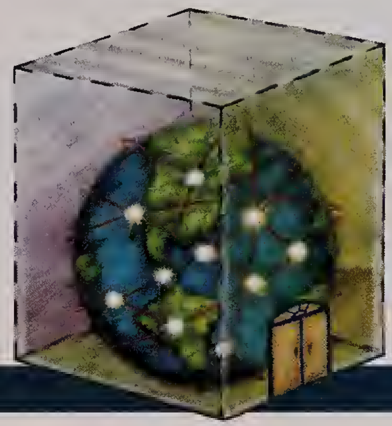
The Object-Oriented Express

Object technology has long been promoted as the solution to all IT problems. Organizations using the technology are finding that, while it isn't without its risks, object can indeed offer great rewards.

By John Edwards



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WEBMASTER: NET GAINS

With productivity up and spending on mainframes and leased lines down, Sterling Software has something to crow about.

By Phillip A. Moore

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GARTNER VIEW: THINK LOCAL, CONTROL GLOBAL

Enterprise LAN costs are spiraling out of control, and IS is in the hot seat again. It's time to bring some method to the madness.

By David Cappuccio

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WORKING SMART: HOLD THE INVOICES, PLEASE

When a system that just works isn't enough.

By Christopher Koch

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With a team like this, it's easy to see how applications scale up to

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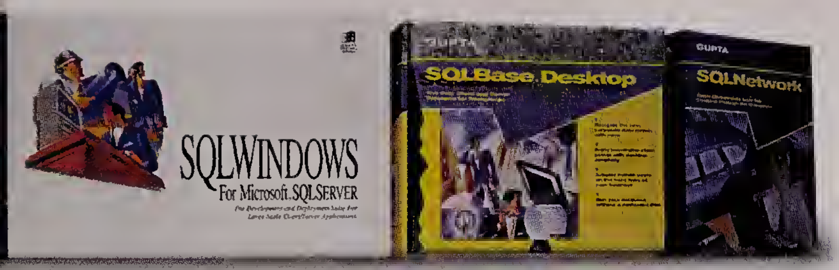

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LETTER FROM THE EDITOR

PHOTO BY WEBB CHAPPELL

Corporate America is falling in love with interim CIOs. Happily, it's just temporary.

The notion of hiring an interim CIO is not a new idea, but it is an increasingly popular one in top management circles these days. What's behind this infatuation? Staff Writer Peter Fabris looks into the affair in "CIOs for Hire" (see Page 56).

In some cases, CEOs at companies undergoing rapid restructuring decide to seek the assistance of an expert with proven IT knowledge and business experience to guide the company through its period of transition. So they hire a contract CIO for a limited engagement. Typically, this hired gun is a business specialist who is customer-focused and sharply attuned to rapidly changing market conditions.

In other, more ominous cases, the CEO who is tired of being outclassed by his competitors resorts to a sweeping change in IT strategy to achieve the company's business goals. Out with the old (CIO) and in with the new. But a search for a full-time IS executive with grade-A credentials can take from six to 18 months, and many companies can't wait that long. So until a new IT visionary can be found, the company opts to hire an interim CIO.

Most observers agree that hiring a permanent CIO remains the best strategy for aligning the IT strategy with company goals. But an interim CIO is an attractive alternative for many organizations. An interim CIO is accustomed to dealing with change, can bring fresh insight and is not wedded to a "way we've always done it" mentality. Those are qualities CEOs prize.

Top management's ardor for contract CIOs is expected to cool by the end of the '90s. By then, CEOs will have figured out what they expect from their IT chief and how to define the role. For now, the interim CIO concept ought to concern permanent CIOs. CEOs have an option—and they are not afraid to exercise it.

On a local note, I am delighted to announce several important changes in the editorial leadership at CIO Communications. Abbie Lundberg, a seven-year veteran of *CIO* and most recently managing editor of the magazine, has been promoted to editor. Richard Pastore, formerly senior editor, has been promoted to managing editor.

In addition, Executive Editor Lew McCreary, who has played a key role in shaping *CIO* from the very beginning, has been named editor-in-chief and publisher of CIO Communications' new publication, *WebMaster*. *CIO* Senior Editor Leigh Buchanan will serve as *WebMaster*'s executive editor.

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CIO

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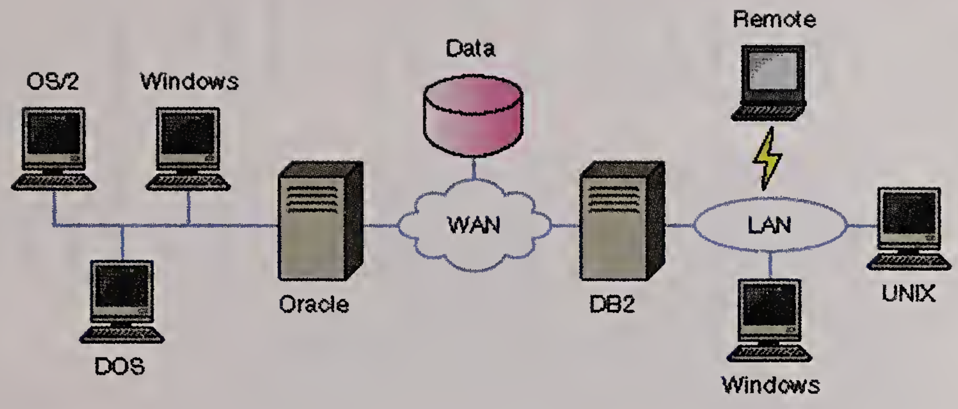

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LETTER FROM THE PUBLISHER

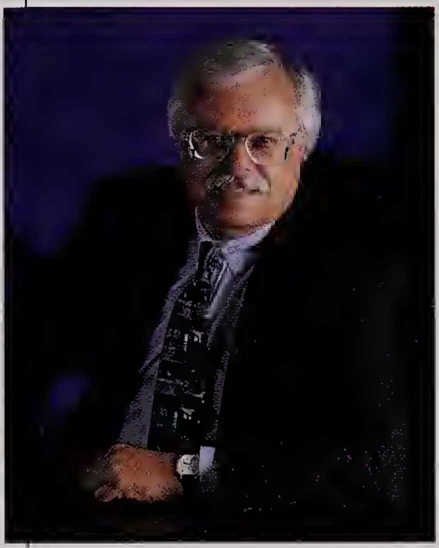

PHOTO BY WEBB CHAPPELL

> *"Those members of MIS who do not have the vision to recognize the benefits of the Net to their organization will find themselves bypassed by more adventurous players."*
>
> *–The Forrester Report*
> *May 1995*
> *Forrester Research Inc.*

If you were fortunate enough to attend the October CIO Perspectives Conference, "The Psychology of IT," you probably walked away with a deeper understanding of relationship dynamics in the workplace, especially between IS and end users.

Working relationships in the office take on a whole new dimension as team-based workgroups emerge as a more efficient way to manage and implement projects. One of the best examples of that can be seen in World Wide Web and Internet endeavors. Web initiatives tend to be shared by IS and almost every department (marketing, operations, human resources, legal) that realizes the benefits and potential of the Web. Teamwork, collaboration and distributed decision making are essential factors for success of the project.

So what's the role of the IT executive in this stew? The CIO provides three critical elements: infrastructure, vision and leadership. He or she must supply a solid platform for deploying the Internet network and continually show the team the potential and power of the Web. But the CIO's most important role is that of leader. The IT director controls the infrastructure, possesses the vision and is in the best position to bring together the disparate groups that have come together to make the organization's Web site work.

If you are not up to the task, you will certainly miss one of the most obvious paradigms of our time. If you are ready to connect to the future, be sure to sign up for the March CIO Perspectives Conference, "The CIO & Cyberspace: The Business/Technology Intersection." Call 800 366-0246 for more information.

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Coming In CIO

Shipping Out

In the days when Reagan's Cold War money was pouring in from new Naval contracts to build advanced Aegis-class destroyers, Bath Iron Works saw its IS shop grow from an IBM mainframe to a disparate and disconnected hodgepodge of client/server systems. How will BIW tame its IS monster in today's environment of sharply declining budgets?

Controlling C/S Schedules

Client/server computing has led business professionals to expect more, faster. CIOs who don't deliver client/server applications on time—the overwhelming majority, according to experts—can count on signing their walking papers. Unfortunately, the main forces dragging client/server projects behind schedule are beyond CIOs' control. By challenging traditional development methodologies, some companies are keeping their large projects on schedule.

Dutch Masters

Seven executives in charge of IS at some of Holland's largest organizations assembled to discuss pressing IS issues and strategies with *CIO*. For our American readers, this microcosm of thinking in the Dutch services industry provides insight into the issues faced by their European counterparts. For CIOs of multinationals, the discussion illuminates some of the headaches of managing decentralized IT installations across multiple countries.

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LET FREEDOM RING

The bell is tolling for 800 toll-free phone service as we know it. It turns out that the trusty three-digit number familiar to businesses and catalog shoppers alike is a victim of its own popularity. With the smallest of companies as well as individuals and pagers utilizing toll-free service, the supply of available 800 numbers is dwindling fast. So phone carriers—led by 800 number inventor AT&T—are hard at work preparing to implement a new toll-free exchange. By March 1996, 888 numbers will also be toll-free.

Introducing a new toll-free exchange is a monumental programming project. Thousands of telecommunications players, including long-distance carriers, regional Bell operating companies and independent operators, need to be able to recognize the 888 exchange as a toll-free service. "It involves every switch and support system that AT&T has, as well as those of every other industry participant involved in offering 800 service or providing access to 800 service," says 888 Implementation Manager Ed Dickerhoff, who is based in AT&T's Bedminster, N.J., facility. In addition to switches, the communications channels or trunks that link phone companies—as well as the entire signaling network—need to be enhanced for 888 service, Dickerhoff adds. And companies that have older-model internal telephone switching systems, known as PBXs, will have to install enhanced software packages (available from AT&T and others) that recognize the new exchange.

AT&T has been working on 888 implementation for the past year or so, but the project recently has taken on a sense of urgency. During one week last June, 113,000 new 800 numbers were assigned, leaving only 600,000 available. To ensure that 800 numbers don't run out before 888 service is ready, the Federal Communications Commission (FCC) stepped in and began rationing those remaining. The FCC is making only 28,000 new 800 numbers available weekly, with phone carriers receiving a base allotment of 25. The FCC will assign additional numbers to phone carriers based on their market share of toll-free service.

Because some toll-free

SOON THEY'LL BE BUNDLED WITH COUGH DROPS

Here's one from the "you-just-can't-win" department. According to an Aug. 17, 1995, article in *The Wall Street Journal*, frequent users of voice-recognition technology have begun to complain of hoarseness and sore throats. People with disabilities who rely heavily, if not exclusively, on the technology seem to be most at risk. So sufferers of carpal-tunnel syndrome and other keyboard-related repetitive stress injuries who seek relief by using voice recognition may end up sparing their tendons at the cost of damaging their vocal cords.

Some voice experts blame the halting way people must speak to make themselves understood by voice-recognition systems. If air does not pass through the vocal cords—as often happens with words beginning with vowels—then the cords can swell, causing hoarseness or pain. The *Journal* reported that one scratchy-voiced user alleviated much of his discomfort when he programmed his computer to recognize "do it" in place of "enter." For their part, vendors claim that vocal-cord damage is rare. A spokesperson at Dragon Systems Inc., a manufacturer of dictation systems in Newton, Mass., conceded that strain can occur, but only when people speak louder than normal or enunciate too enthusiastically.

To minimize vocal strain, speech therapists recommend doing deep-breathing exercises, drinking lots of liquids and sitting upright. And above all, eliminate extraneous yelling. ▬

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Patricia Seybold Group

Data Warehousing:

Turning Data Into Decisions

As Featured in **COMPUTERWORLD** and CIO

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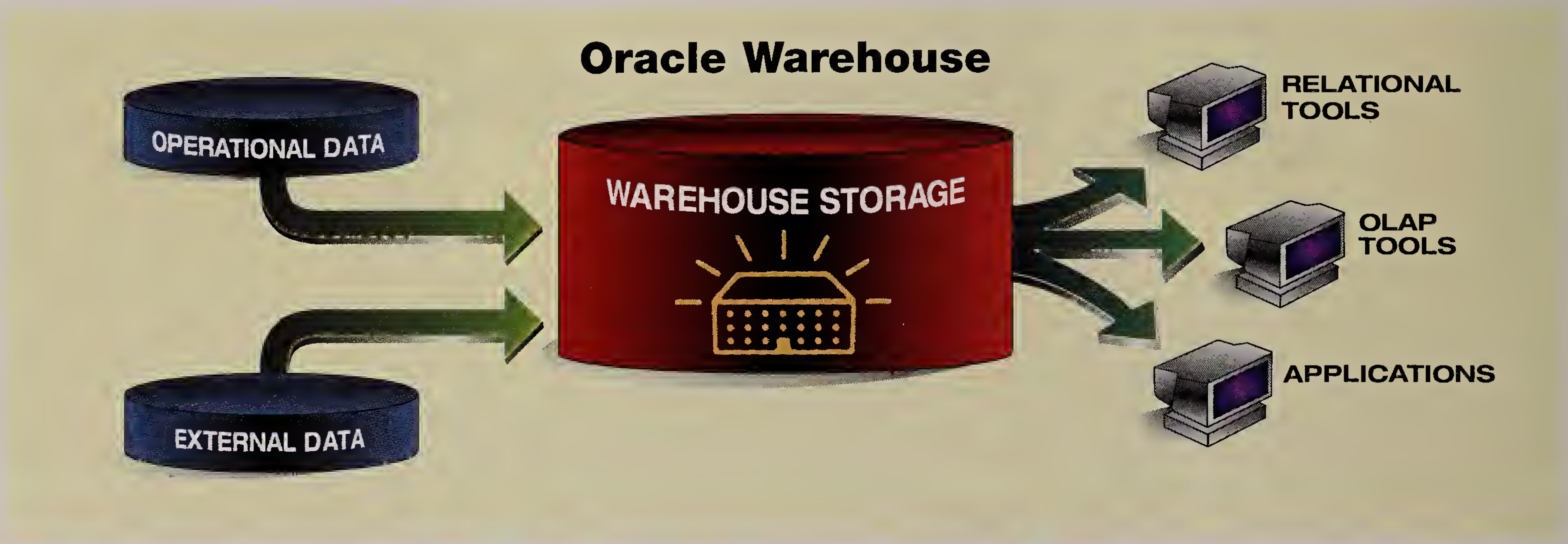
Only Oracle offers everything needed to build, maintain and use a data warehouse. The Oracle Warehouse breaks the barriers of existing data warehousing solutions by giving corporations access to all their information—in any form, wherever it exists. Data warehouses built around Oracle scale from gigabytes to terabytes, and meet the information retrieval and business decision making requirements of any user in an enterprise.



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Oracle Open Gateways provide direct access to more than 25 non-Oracle data sources. Oracle7 Symmetric Replication automatically replicates operational data to your warehouse. Oracle7 Parallel Loader rapidly populates your warehouse with vast amounts of external data from flat files. And third-party products for data extraction and transformation have been specifically tuned to support the Oracle Warehouse.

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Providing Any Access

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Introduction

Better Decisions Mean A Better Bottom Line

1995 could be dubbed the year of the data warehouse. In the past eight months, most vendors of large systems and databases have announced data warehousing programs and strategies, and most large corporations have initiated projects to build data warehouses. Meanwhile, there is a data warehouse conference somewhere in the world every month.

With all the hype and hoopla, you might think there is something radically new about the concept of data warehousing. In reality, data warehousing is simply a new approach to gathering data and generating reports from corporate information systems.

Data warehousing differs from traditional reporting systems in two ways. It gives end-users direct access to corporate data with powerful graphical query and reporting tools. And it calls for the creation of a separate decision support database extracted from one or more operational systems.

These two principles fundamentally alter the way business users interact with corporate data and how companies leverage that data. With data warehousing, the IS shop is no longer a broker between business users and corporate data. Users access the data directly, when and how they want. Instead of submitting requests to IS that might take weeks to fulfill, they can execute queries and build reports on their workstations . . . freeing the IS department to focus on tasks such as building applications.

Data warehousing also lets users navigate large corporate data stores in an ad hoc, interactive fashion without impacting mission-critical operational systems. Users can issue one query after another in an iterative manner to explore trends, pinpoint problems and evaluate market opportunities. The result is that business users can make better decisions more quickly, and, in so doing, add to a company's bottom line.

Wayne Eckerson is a consultant for The Patricia Seybold Group, and editor-in-chief of its monthly report, *Open Information Systems*. Eckerson specializes in the areas of mainframe migration, data warehousing, decision support tools and distributed computing middleware. He also has editorial responsibility for covering client/server and open systems trends and products. The Patricia Seybold Group is a Boston-based consulting, research, and information services firm that specializes in client/server and distributed computing. It is recognized as a leading consulting and research firm in the fields of distributed object computing, groupware, end-user computing and DBMSs.

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Oracle Warehouse

Technology and Services for a New Market Segment

Oracle Corp. was not the first database vendor to announce a data warehousing strategy. But it may be the most significant.

Its relational database, Oracle7, is already the dominant open systems platform for building data warehouses. Flanking Oracle7 are the company's administrative tools for designing data warehouses, infrastructure tools for moving queries and data across networks, and end-user tools for accessing and analyzing warehouse data. Oracle also has a 4,000+-strong consulting force that is highly skilled in data management issues.

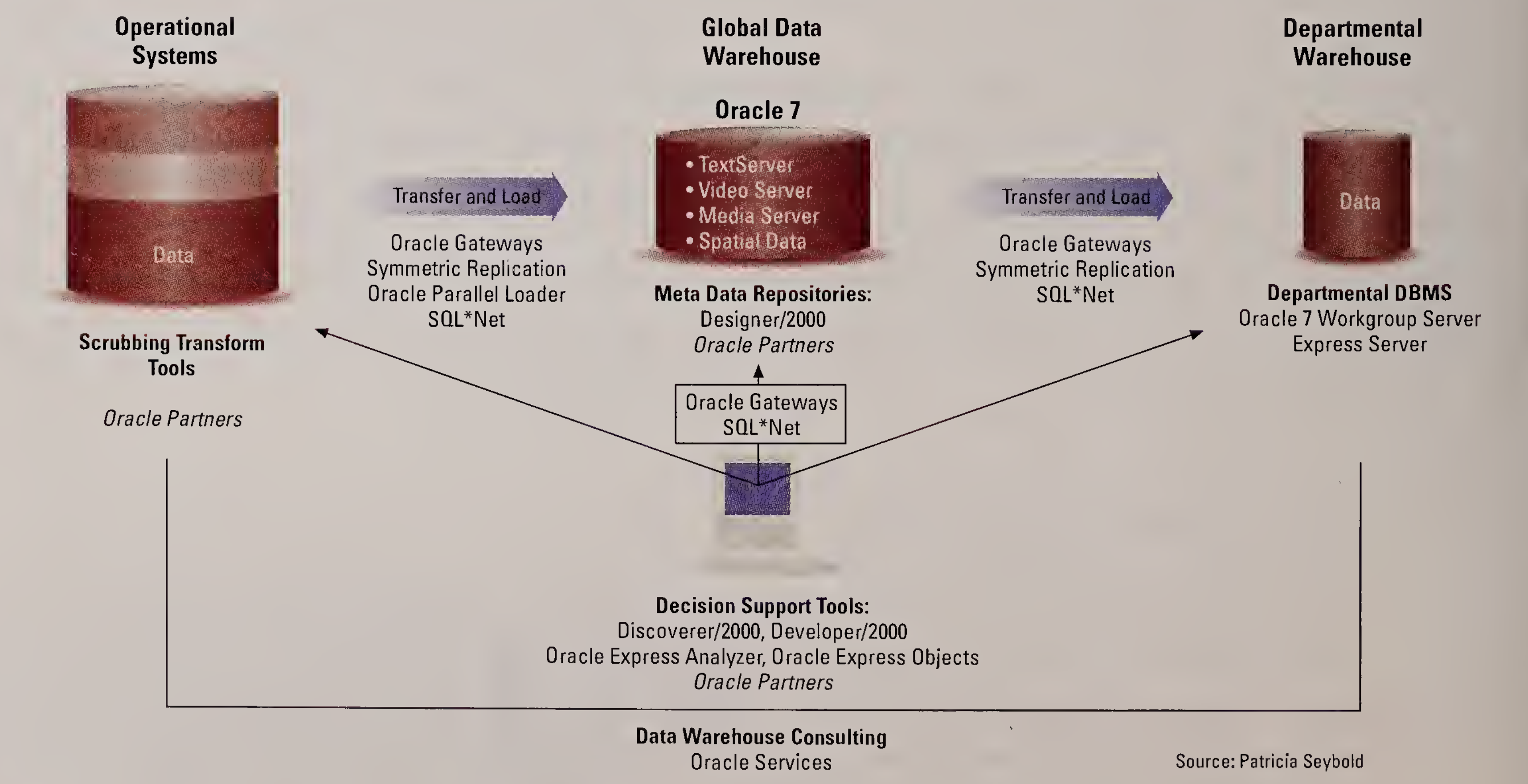
Oracle admits that it doesn't provide all the products to meet customers' data warehousing needs, and it is still building experience selling a total solution such as data warehousing. But the company has developed close relationships with vendors of data warehouse components to fill in the gaps of its own offerings and to ensure tight integration between those offerings and third-party products. Oracle is also forming internal cross-product teams to coordinate the development and marketing of its data warehousing solutions.

Leveraging information

Most companies now realize that the only way to sustain an advantage in today's economic climate is

FIGURE 1

Oracle Warehouse Components



Source: Patricia Seybold

to leverage information better than the competition. But in most companies, information is locked up in large, operational systems as well as desktop databases, personal rolodexes, trip reports and meeting notes. And external data, such as newspaper articles, point-of-sale data and market feeds, is something that few companies effectively leverage. Data warehousing promises to unlock the breadth and depth of corporate data and make it available to end users. Companies that can best tap into this information will enjoy a competitive advantage.

Data warehousing has been made possible by several client/server technologies. Personal computers with snazzy GUIs have made it easy for end users to manipulate and analyze data. Powerful Unix servers and relational databases have made it possible to bring data closer to end users. The sharp decline in disk drive prices makes it cost-effective to store vast amounts of data on low-cost open systems platforms.

A separate warehouse minimizes the impact that queries have on operational systems and also safeguards operational data against being changed or lost.

Separate data stores

Data warehouses are separate data stores designed to support decision support applications. A company populates a warehouse with data from operational databases as well as whatever unstructured and external data is appropriate. There are good reasons to create a separate decision support database or data warehouse. A separate warehouse minimizes the impact that queries have on operational systems and safeguards operational data from being changed or lost. It also allows administrators to create new data by merging fields from more than one operational system. A warehouse can also be modeled to conform to the way in which users view data.

Building a data warehouse requires many components (Figure 1). Most data warehouse vendors have formed alliances with providers of niche technology to round out their offerings.

Extract/transformation tools provide administrators with a GUI for mapping operational data into a data warehouse. They allow administrators to convert and integrate operational data, resolving inconsistencies in syntax, data formats and definitions. These tools can also aggregate data by adding all rows for a particular field or applying other mathematical computations to derive new values.

These tools generate an extract program, usually in Cobol or C, that runs against the legacy system and spits out a flat file. They also generate detailed meta data that describes source and target databases, types of transformation applied, date of last refresh, etc. Vendors that offer such tools include Prism Solutions, Carleton, Evolutionary Technologies (ETI) and Apertus.

Most data transfer tools take a flat file generated by an extract program and move it to the target data warehouse, where it is loaded. The most common way to move extract files is by "sneakernet" via tape. After that, companies use either bulk file transfer tools, such as Trinzic's InfoPump or Legent's Legacy Data Mover, or database gateway tools, such as Oracle Gateways or Information Builders' EDA/SQL.

More sophisticated methods of transferring data include database replication services and message-oriented middleware. These tools are useful when companies just want to propagate delta changes from operational to data warehouses. Delta change replication is critical when there is not enough time in an overnight batch window to reload an entire database.

The data warehouse is a database that must have a logical and physical model before it can be populated. Such a model can be created with pencil and paper, or with advanced modeling tools that automate the process and capture relevant meta data, such as CASE tools.

Most data warehouses are built on RDBMSs, usually running on Unix, although there are many MVS/DB2 warehouses. Three criteria for RDBMSs are whether they can scale to support huge volumes of data and complex queries; which client-side tools they support; and how fast their loading mechanisms are, to minimize downtime for users.

RDBMSs can be distinguished by how much they support parallel database operations, data partitioning, indexing schemes and table join methods. Traditional criteria such as performance, portability and manageability are also valid for warehouses.

The hundreds of query tools available all give users a GUI for selecting a data set, defining a query and creating a report to output the results. More advanced tools map tables and columns in a back-end database to business subjects, such as customer, product and region; this shields users from having to learn SQL or the internal structure of a database. Sophisticated tools also offer server-based processing to offload complex or long-running queries from the client as well as to provide centralized control of security and resource management.

No one tool meets the needs of all business users. To serve their different constituencies, most companies buy many tools. One tool may meet the needs of 80% of all users, but there are always specialists or generalists who require something different.

Four types of users

The Patricia Seybold Group defines four types of business intelligence users: Clerk, Knowledge Worker, Analyst and Executive. Each has different information requirements (Figure 2). Many companies purchase different tools for each type. For example, Chase Manhattan uses a custom-built PowerBuilder application for routine data access and executive drill down, Business Objects for ad hoc query and reporting and SAS for statistical analysis.

In decision support environments, multidimensional analysis is critical; it allows users to view and analyze data along dimensions such as product, geography and time. Users can then drill down to find exceptions and trends. A product manager might need to view sales of canned goods this year versus last year, but may want to drill down to find out soup sales in the Southeast during May.

Multidimensional analysis has been the province of specialized databases that precompute values at the intersection of all dimensions prior to loading data. Special tools, such as Pilot LightShip, Cognos PowerPlay and GQL Pablo, are required to access these databases. However, the newest ad hoc query tools, such as MicroStrategy's DSS Agent and Prodea Software's ProdeaBeacon, can perform multidimensional analysis against relational databases.

Multidimensionality has quickly become an earmark signalling the robustness of a vendor's decision support or data warehouse offering. Oracle's recent acquisition of IRI Software, a company that provides a specialized multidimensional database as well as accompanying tools and applications, is the most aggressive move to date by a data warehouse vendor to offer multidimensional capability.

The above mentioned components and requirements offer a framework for evaluating Oracle's data warehouse initiative, which was launched in June.

Customers drive solutions

Oracle's data warehousing initiative has been driven by its customers. Rather than Oracle foisting new technology upon its installed base, customers have asked Oracle for direction to advance planned or existing data warehouse projects. Customer interest in data warehousing caught Oracle unprepared, but it is now racing to catch up with demand.

Oracle has shaped its data warehouse program accordingly. Instead of pitching products and technologies, Oracle has recognized that customers want integrated solutions. Selling solutions, rather than technology, is a new approach for Oracle. But it is taking steps to ensure the success of the program.

For instance, Oracle has established new communications channels among its previously independent product groups, and it has created a partners program to foster ties with vendors of data warehouse components. Without integrated components and strong partnerships, Oracle realizes it cannot deliver the data warehouse solutions users want.

It is safe to say that more customers of Oracle are building data warehouses than any other vendor. That so many companies are using Oracle7 as a foundation for their data warehouses, as well as other Oracle products, testifies to the suitability of Oracle technology for decision support solutions.

But Oracle is not sitting still. The company provides a full set of data warehouse components, offering query tools, development tools, CASE tools, SQL gateways and data warehouse consulting. Oracle may not offer best-of-breed tools in each category, but the breadth of its offering provides a haven for users who want one-stop shopping. In areas where

Oracle does not provide tools or services, it has allied with key players (Figure 3).

The foundation of Oracle Warehouse is the Oracle7 RDBMS, which runs on dozens of platforms, including Unix, MVS and Windows NT. It scales from the desktop to symmetric multiprocessing clusters and massively parallel processing machines. Oracle7 also supports all types of data that data warehouse users may want to access: structured data, text, image, audio and video. Oracle SQL*Net is middleware that provides connectivity to Oracle7 from desktop applications and legacy systems.

If Oracle7 is the foundation, Oracle Services is the glue that helps users meld Oracle Warehouse components into a working application. Oracle is training a high percentage of its 4,000+ worldwide consulting force to provide the project planning and expertise to manage data warehouse accounts.

Today, there are more than 100 Oracle consultants piecing together their experiences to build and refine a data warehousing consulting framework or methodology. During the next 18 months, Oracle plans on training all its consultants in this methodology via a series of six-week "boot camps."

To jumpstart data warehousing projects, Oracle is crafting data model templates for vertical industries. It already has a marketing management model for telecommunications, a template that it plans to replicate in other industries. Oracle consultants will play a big role in building very large data warehouses. It is unclear at this time whether Oracle will also provide a quickstart program to help companies build small warehouses or whether it will outsource this to systems integration partners.

To fill in the gaps of its data warehouse solution, Oracle has established an alliance program, the Warehouse Technology Initiative (WTI), in which a host of partners provide tools for scrubbing and extract/transformation, modeling and query/reporting. Many of these tools compete with existing Oracle products. For example, a dozen WTI partners offer query and reporting tools that compete with Oracle's Discoverer/2000 series. Oracle opted to provide an open solution rather than force users to deploy tools that they may not like or swap out tools that they have already deployed.

The idea behind WTI is to create a dialog between partners and Oracle developers to forge stronger integration between WTI tools and Oracle products, as well as resolve customer problems more quickly. WTI partners get advance information about Oracle products and strategy, pre-release software and documentation, and early training on new Oracle data warehouse technologies. Oracle gets to promote Oracle/WTI solutions at seminars and trade shows and with its consultants and salesforce.

The following is a review of Oracle's data warehouse offerings:

FIGURE 2

Decision Support Tools

Types of Users	Information Requirement	Type of Tool	Available Products
Clerk	Basic data retrieval	Custom applications	• Developer/2000 • Express Objects • PowerBuilder • Visual Basic
Knowledge Worker	Ad hoc database navigation, and point-and-click reporting	Ad hoc query and reporting	• Discoverer/2000 • Business Objects • Andyne GQL Brio • DataPivot
Analyst	Complex analysis	Multidimensional and statistical analysis	• Express Analyzer • SAS • MicroStrategy • Prodea Software
Executive	Graphical Drill Down	Executive Information System	• Pilot Lightship • Forest and Trees • Express Analyzer

Source: Patricia Seybold

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Scrubbing, extraction and transformation. Oracle relies primarily on WTI partners to clean up and transform legacy data prior to loading it into a data warehouse. Oracle partners with Innovative Systems and Vality for scrubbing products. It works with Prism Solutions, Carleton and ETI, three companies that provide extraction and transformation products that work with most legacy systems.

Besides transforming legacy data, extraction/transformation tools also generate warehouse meta data as a byproduct of their mapping data between source and target databases. This makes these tools critical for maintaining and updating data warehouses. Oracle will work with Prism, Carleton and ETI to create bidirectional bridges between these transformation products and Oracle tools such as Discoverer/2000 and Designer/2000.

Transfer and load. Oracle has many tools to move data from legacy systems to data warehouses. Oracle Transparent Gateways provide connectivity to Oracle7 from mainframe data sources, such as IMS, DB2/MVS, VSAM and IDMS, as well as Unix-based RDBMSs from Informix, Sybase and Computer Associates (CA_Ingres). Oracle also has a DRDA Gateway for accessing IBM DB2 and other DRDA-compliant databases.

The gateways enable administrators to use SQL to populate Oracle7 with legacy or non-Oracle data. The gateways also can perform data transformations of SQL data, such as combining, separating, renaming and computing table fields. Users can also employ the gateway to transfer data into a staging area where more sophisticated transforms can be applied, perhaps with Oracle's PL/SQL.

An unforeseen bottleneck in data warehousing is the process of loading data into the warehouse once a gateway or file transfer mechanism gets it there. Often companies have a small window at night when they can run a batch program to load the warehouse. This can be a big problem when data warehouse volumes exceed hundreds of gigabytes and must be refreshed on a nightly or weekly basis.

Oracle offers several mechanisms for loading warehouses. For high-speed loads, a parallel direct-path loading utility pages data directly to disk in parallel. This utility can load in excess of 100GB of data per hour, depending on the number of disks, processors and instances of the loading utility applied. Companies that want to ensure the integrity of data being loaded can use SQL inserts to load an Oracle7 database.

Companies can ease loading volumes by propagating only the operational data that has changed rather than refreshing the entire warehouse. Replication is a natural fit to propagate delta changes. Oracle plans to expand its symmetric replication facility in Oracle7 to work with non-Oracle databases,

FIGURE 3

Data Warehouse Functions	Oracle Products/Features
• Extraction, transformation and transportation	• Oracle Transparent Gateways
	• Oracle Symmetric Replication
	• Oracle SQL*Net
• Large volume data loading	• Oracle Parallel Direct Path Loader
• Indexing large tables	• Oracle Parallel Index Builder
• Backup/recovery of large data sets	• Oracle Parallel Backup & Recovery
• System fault-resilience	• Oracle Parallel Server
• Data warehouse security	• Oracle Secure Network Services
• Fast query performance on large data sets	• Oracle Parallel Query Option
	• Oracle Cost-Based Optimizer
• User-defined server-based business functions	• Oracle User-defined SQL functions
	• Oracle PL/SQL
• Text/document storage and retrieval	• Oracle TextServer with ConText
• Multi-media/video storate and retrieval	• Oracle Media Server
• OLAP storage and retrieval	• Oracle Express Server
• Spatial data storage and retrieval	• Oracle Spatial Data Option
• Internet and World Wide Web interface	• Oracle Web Server
• Warehouse design & meta data management	• Oracle Designer 2000
• Ad hoc query and reporting — relational	• Oracle Discoverer/2000
• Ad hoc query and reporting — OLAP	• Oracle Express Analyzer
• Custom application development — relational	• Oracle Developer/2000
• Custom application development — OLAP	• Oracle Express Objects
• Data warehouse pre-built applications	• Oracle Applications Data Warehouse
	• Oracle Sales Analyzer
	• Oracle Financial Planner

Source: Oracle Corp.

including legacy systems. This will facilitate the growth and maintenance of large-scale data warehouses on Oracle7.

Modeling. Before you can load a data warehouse, you need to create a logical and physical data model for it. Oracle Designer/2000 is an upper- and lower-CASE tool that can be used to create these models as well as the meta data for maintaining the data warehouse. Earlier this year Oracle added process modeling and systems design modules to the product.

One challenge in modeling a data warehouse is knowing in advance what kinds of information users need. The process modeler enables database administrators to capture user requirements by charting business processes. The tool can be used to identify the sources of data users need, how often it needs to be refreshed, the depth and breadth of information required and user expectations about accessing it. This forms the basis of warehouse meta data.

The systems designer — Oracle's lower-CASE tool — maps the entity-relationship diagram (logical model) to a physical model. It can generate star schema models which offer fast-performance query-intensive environments. The module also defines tables, indexes and views to optimize data access.

Required element

The only required element in Oracle Warehouse is Oracle7. Oracle laid the groundwork for its data warehouse initiative in June 1994 when it added the Parallel Query Option (PQO) to Oracle 7 Release 7.1. With PQO, Oracle 7 Release 7.1 can execute queries in parallel that include at least one table scan. PQO parallelizes all query operations, including scans, sorts, joins and aggregations. Parallel queries can reduce the time required to process a request as well as scale up the request to run against more data without suffering a drop in performance. PQO also parallelizes index builds, data loads and user-defined functions. Oracle7 already provides support for parallel backup, restore and recovery.

Oracle recently released Oracle7 Release 7.2 and will ship Oracle7 Release 7.3 by year-end. To improve query performance, both releases contain the enhancements listed below:

Direct Database Reads and Writes. Parallel query processes must often scan very large tables or write results back to disk. Direct Database Reads provide direct contiguous disk to contiguous memory reads, and Direct Database Writes provide direct contiguous memory to contiguous disk writes. This also minimizes contention with OLTP activities.

One challenge in modeling
a data warehouse is knowing
in advance what kinds of
information users need.

Asynchronous I/O provides async read-ahead capabilities to maximize processing and I/O resources. This complements Oracle's async write facilities for sorts, summarizations, index building and loading.

Parallel Table Creation. Databases often create temporary tables to hold interim or summarized results of queries, particularly during drill-down analysis to hold the results of intermediate operations. An option in Oracle7 turns off logging functions to improve the performance of table creation. This option also applies to loading and index creation.

Support for Star Query. Optimization, Oracle's optimizer, recognizes star schema databases and can issue optimized star queries. Star queries improve performance against databases using star schema models. A star query first joins multiple small tables, then joins the results to a single large table.

Disk Affinity adds intelligence to PQO's query coordinator, mimicking intelligent partitioning capabilities supported by other databases. Disk affinity means the query coordinator knows which disks (hence data) are associated with which nodes (CPUs) and can ship functions or query operations to those nodes directly for processing, bypassing a shared interconnect. Disk affinity and function shipping can yield all the benefits of a "shared nothing" architecture without associated overhead and costs.

Histograms provide the optimizer with a picture of the distribution of values in a table column, enabling it to select the most appropriate index.

Parallel Hash Joins speed small-to-large table joins which are typical with star schema databases. Parallel hash joins eliminate the need to sort data to per-

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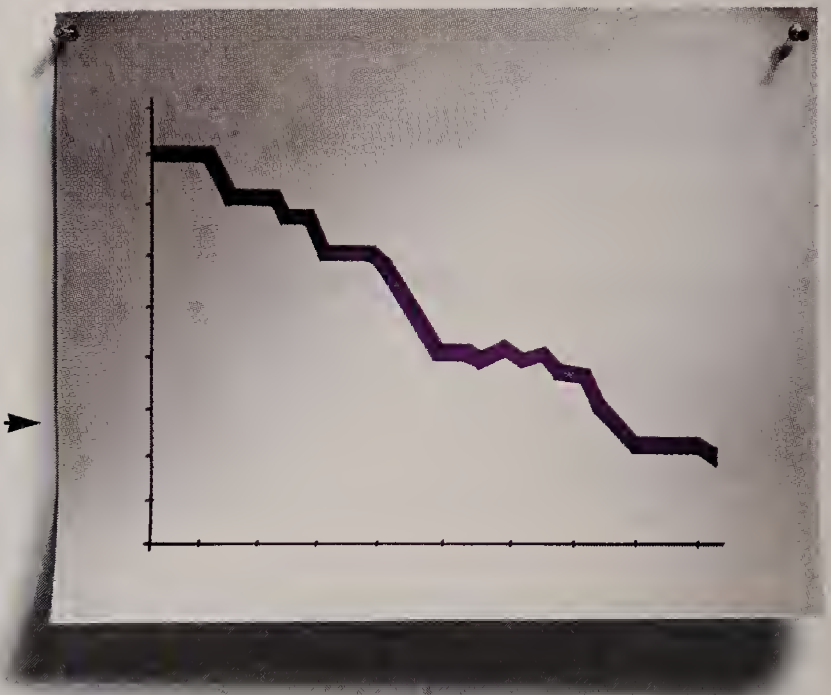

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form joins. Oracle already supports parallel sort-merge and nested-loop joins.

Parallel UNION and UNION ALL. In Release 7.3, Oracle7 will be able to execute queries in parallel that use the set operators UNION or UNION ALL. This will make it easier to manage large tables as a manually partitioned set of smaller tables.

Performance. Oracle recently performed internal tests on Oracle7 Releases 7.1, 7.2 and 7.3. The tests were conducted on a 16-processor Sequent SMP machine running a 100GB database. Oracle claims the tests showed significant performance increase between the releases. Performance for executing complex queries doubled between Releases 7.1 and 7.2, and quintupled from Release 7.2 to 7.3. Performance for drill-down actions increased by 10 times and 20 times from Release 7.1 to 7.3.

Oracle7 Release 7.1 supports dynamic partitioning of data. This means two different processes can run against the same disk simultaneously, improving throughput. It also allows Oracle7 to repartition data dynamically in memory to facilitate a join when data spans nodes. In contrast, most other databases support static partitioning, where an administrator must manually repartition the data.

> Disk affinity and function shipping can yield all the benefits of a "shared nothing" architecture without associated overhead and costs.

Oracle7 supports multiple data types through add-on modules or gateways. These are:

Oracle TextServer with ConText. This Oracle7 add-on enables users to store and retrieve text and documents through applications using SQL.

Oracle Spatial Data Option. Lets users store spatial data, such as maps, charts and digitized images, in Oracle7 rather than specialized geographic information systems. Data can then be accessed via SQL by visualization and analysis tools such as MapInfo.

Oracle Media Server. Lets Oracle7 store or retrieve multimedia data (audio, video, text and images).

Oracle Web Server Option connects World Wide Web users directly to the Oracle Warehouse. The product enables companies to easily disseminate warehouse information to both internal and external Web users.

Query Tools: Discoverer/2000 combines new releases of two query products, Oracle Query and Oracle Browser. Oracle Query presents business users with pivot tables to drill down on multidimensional hierarchies. Oracle Browser gives developers the option to work directly against relational tables. Both are two-tier, client/server applications. The two products are packaged together and sold for $395.

In Discoverer/2000, both tools can work off the same meta data or semantic mapping layer. This layer insulates users from SQL and database structures. It presents a business-oriented view of data in Oracle7 databases. In addition, both tools leverage an Oracle7 API call that allows users to submit long-running queries without tying up their client machines. The tools also are available on Windows, Macintosh and Motif, and provide integrated reporting and charting. They also integrate with other desktop productivity tools via OLE.

Oracle has established partnerships with more than a dozen providers of query tools. Most of these tools, like Discoverer/2000, provide limited forms of analysis. For example, multidimensional views of data must be hard-wired with SQL, making the tools difficult to administer. Tools in this category include Business Objects, Cognos Impromptu, Andyne GQL and Brio DataPivot.

Tools from several WTI partners generate multidimensional analyses on-the-fly as well as other calculations, such as rankings, sorts, averages, aggregations and variances. Moreover, these tools perform such analyses against relational data without sacrificing performance. Typically, such analyses require specialized multidimensional databases to ensure adequate performance. WTI partners that provide "multi-relational" tools are MicroStrategy (DSS Agent), Information Advantage (Axsys) and Stanford Technology Group (MetaCube.)

Oracle acquired IRI Software to offer sophisticated analytical tools for business analysts and managers. IRI provides a proprietary multidimensional database, now called Oracle Express Server, as well as tools for leveraging multidimensional data, includ-

FIGURE 4

Oracle Warehouse Technology Initiative Partners

- Andyne Computing Ltd.
- BancWare
- Brio Technology
- Business Objects
- Carleton Corp.
- Cognos Corp.
- DB Star
- Dynamic Information Systems
- Evolutionary Technologies
- Holistic Systems
- Informatica Corp.
- Information Advantage
- Information Builders
- Information Harvesting Inc.
- Innovative Systems
- IQ Software Corp.
- IRI Software
- Kenan Systems
- Logic Works
- MapInfo Corp.
- MicroStrategy
- NexTek Software Inc.
- Open Data Corp.
- Pilot Software
- Platinum Technologies
- Postalsoft
- Praxis International
- Prism Solutions
- Prodea Software
- QQQ Software Inc.
- Sequent Computer Systems
- Smart Corp.
- Software AG
- Stanford Technology Group
- Vality Technology

Source: Oracle Corp.

ing Oracle Express Objects and Oracle Express Analyzer. On the server side, Oracle will initially offer Express as a front-end to Oracle7. Users can work directly against Express or they can pass through SQL requests in the form of stored procedures to Oracle7.

Oracle plans to tighten integration between the two products to improve the performance of the pass-through capability. Oracle also wants to create a bidirectional interface in which Oracle data is pushed into Express in a synchronized, manageable fashion. Long-term, Oracle is considering incorporating Express into the Oracle7 engine.

On the client side, Oracle picks up various analytical applications and tools that run against IRI Express. These includes sales and marketing, financial and technology applications.

The sales and marketing application named Oracle Sales Analyzer includes an ad hoc query tool, and a library of predefined reports and graphs for analyzing sales performance and trends. Financial applications include the Oracle Financial Planner, a client/server decision support application; and Excel Add-In, a spreadsheet interface to Express. Technology applications include Oracle Express Analyzer, a reporting and analysis tool; and Oracle Express Object, an object-oriented environment for creating multidimensional applications.

These applications and tools round out Oracle Warehouse. IRI's tools provide analysis capabilities that complement Oracle's and its partners' ad hoc query and reporting tools.

For customers who want to build their own query and reporting applications, Oracle offers Developer/2000 (formerly called Cooperative Development Environment). It consists of three tools — Oracle Forms, Oracle Reports and Oracle Graphics — that generate applications for Windows, Macintosh, Motif and character platforms.

Conclusion

Oracle is in a prime position to succeed in data warehousing. It has one of the most robust database servers, the largest installed base of warehouse users, the biggest consulting practice and a broad line of data warehouse components.

Oracle must remain focused and committed. If it falls back into old habits of pushing products instead of solutions, it may disappoint its customers — or worse, cede the market to others. Oracle needs to continue to pry open channels within the company to ensure cooperation among product groups.

It is important that Oracle integrate appropriate products to make implementing an Oracle Warehouse relatively painless. Data warehousing by nature is a systems integration exercise, and the most value Oracle can provide is to create a unified environment that gets people 80% of the way to their destination.

Consequently, Oracle needs to lead with its consulting group, to let its consultants and salespeople on the front lines drive its data warehouse program and identify areas for new services and products and opportunities for integration.

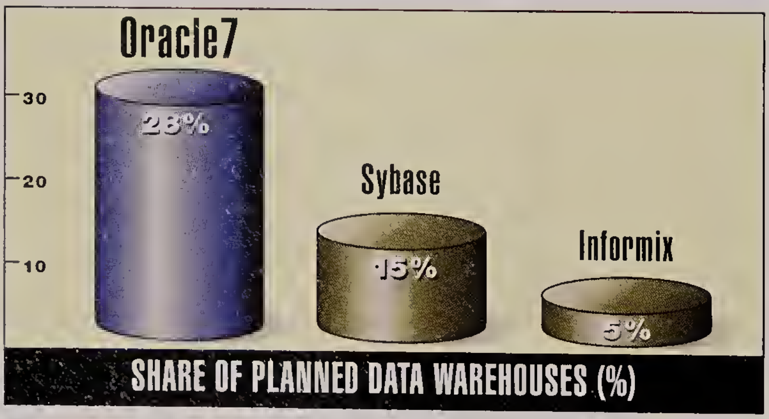
Data warehousing is one of the first manifestations of a kinder, gentler Oracle that knows how to partner with third parties and also knows how to cooperate internally to provide customer-focused solutions. Let's hope it continues. ■

Before You Look Into A Warehouse, Check This Inventory

Data warehouses are central information repositories for storing and analyzing vast amounts of historical and reference data from a number of different sources, enabling users to gain insights into corporate performance and customer behavior that cannot be gained using disconnected operational systems. Oracle7 has more production features for data warehousing than any other DBMS available, bringing very large database capacity, fast query execution and the management of any data type to the open systems data warehouse.

DATABASE COMPARISON

	ORACLE7	Sybase System 10	Informix 7.1
Terabyte Databases Supported	Lots	Never	None
300+ Gigabyte Databases Supported	Hundreds	Never	None
Scalable SMP Support	Yes	Never	Yes
Scalable MPP Support	Yes	Never	No
Parallel Query	Yes	Never	Yes
Parallel Load	Yes	Never	No
Parallel Index	Yes	Never	Yes
Parallel Summarization	Yes	Never	Yes
Parallel User-defined Functions	Yes	Never	No
Star Query Optimization	Yes	Never	No
Integrated Replication	Yes	Yes	No
OLAP Integration	Yes	Never	No
In Memory DB (64-bit)	Yes	Never	No
Integrated Text/Video	Yes	Never	No
Spatial Data Integration	Yes	Never	No
READY FOR YOUR WAREHOUSE?	YES	NEVER	NO



META GROUP *ADS Data Warehousing Survey* 1995

According to Meta Group, Oracle7 is chosen by users nearly twice as often as Sybase and five times as often as Informix for data warehousing applications. If enabling employees to make fast, accurate decisions is important to your company's performance, call Oracle at 1-800-633-1071, Ext. 1097. Or download videos of our customers explaining the competitive advantage they get from the Oracle Warehouse solution at http://www.oracle.com/info/dw/video.html.

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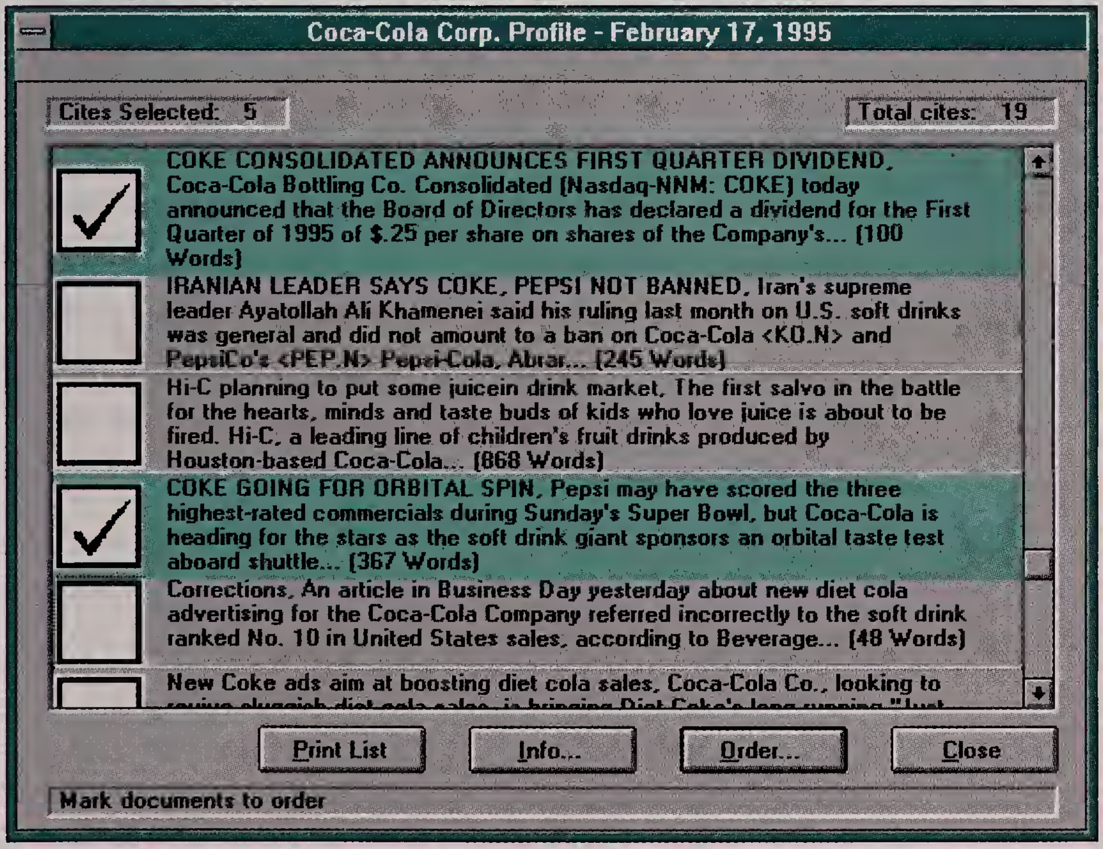

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☑ COKE CONSOLIDATED ANNOUNCES FIRST QUARTER DIVIDEND. Coca-Cola Bottling Co. Consolidated (Nasdaq-NNM: COKE) today announced that the Board of Directors has declared a dividend for the First Quarter of 1995 of $.25 per share on shares of the Company's... (100 Words)

☐ IRANIAN LEADER SAYS COKE, PEPSI NOT BANNED. Iran's supreme leader Ayatollah Ali Khamenei said his ruling last month on U.S. soft drinks was general and did not amount to a ban on Coca-Cola <KO.N> and PepsiCo's <PEP.N> Pepsi-Cola. Abrar... (245 Words)

☐ Hi-C planning to put some juicein drink market. The first salvo in the battle for the hearts, minds and taste buds of kids who love juice is about to be fired. Hi-C, a leading line of children's fruit drinks produced by Houston-based Coca-Cola... (868 Words)

☑ COKE GOING FOR ORBITAL SPIN. Pepsi may have scored the three highest-rated commercials during Sunday's Super Bowl, but Coca-Cola is heading for the stars as the soft drink giant sponsors an orbital taste test aboard shuttle... (367 Words)

☐ Corrections. An article in Business Day yesterday about new diet cola advertising for the Coca-Cola Company referred incorrectly to the soft drink ranked No. 10 in United States sales, according to Beverage... (48 Words)

☐ New Coke ads aim at boosting diet cola sales. Coca-Cola Co., looking to

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numbers—such as 1 800-FLOWERS—are so familiar, having two exchanges poses a serious problem. "We have some very large customers with recognizable 800 numbers," explains Dickerhoff. "We're fearful that their competitors will get the same number with an 888 exchange." AT&T and other carriers are hoping that the FCC will permit a certain percentage of customers to, in effect, brand their toll-free telephone service by having dibs on the same number with both exchanges.

Dickerhoff says that the supply of 888 numbers should dwindle in three or four years, but not to worry. "Instead of preparing the network for just 888, we're preparing it for a whole series of toll-free numbers, from 877, then 866, down to 822," he says. Once the initial implementation project is rolled out in March 1996, a vast pool of toll-free numbers will be available to the industry.

–Megan Santosus

ASK WHAT YOUR GOVERNMENT CAN DO FOR YOU

Smart governments look out for more than just their country's major corporations. That's why the United States has the Small Business Administration, and that's why Industry Canada, the economic flagship of the Canadian federal government, worked with Dataware Technologies Inc. To deliver 10,000 CD-ROMs to Canadian businesses free of charge in what represents Canada's largest CD-ROM publishing project to date.

Insight Plus on CD-ROM is a partnership between industry and the public sector to provide a cost-effective means for Industry Canada to distribute business intelligence data to Canadian companies. With access to 600MB of textual, graphical and numerical information in a CD-ROM format, organizations are able to perform full-text searching through multiple types of information, including data on domestic and international trade, technology transfer and licensing opportunities, government policy and regulation, market research reports and relevant contacts. The CD-ROM also includes telecommunications links to the Internet and government services such as Industry Canada Online.

Tim Garrard, director general of the Information Technology Industry Branch at Industry Canada, explains, "This pilot marks an important first step in Industry Canada's move to provide industry, particularly small to medium-sized businesses, with improved and affordable access to the sources of strategic information that can help make a difference in an increasingly competitive global marketplace." ■

YOU'RE FIRED. NOW HOW CAN WE BE OF SERVICE?

One of the golden rules of service is to walk in your customers' shoes and see the world from their perspective. Over the next three years, thousands of Canadians will be doing just that, but they're not happy about it.

The *Toronto Star* recently reported that the Canadian government will close 150 employment centers and lay off 5,000 people who provide job counseling to the unemployed. Replacing the center employees will be 400 self-service computer kiosks similar to automated teller machines.

Lloyd Axworthy, Canada's human resources minister, expects the change to trim $600 million Canadian ($445.9 million U.S.) from the budget during the next three years. He also believes that the kiosks will improve access to employment services because machines will be placed in libraries and shopping malls, in addition to other public places. The unemployed can use the kiosks to get information on jobs, unemployment insurance and retirement benefits. For those who need or want personal attention, 300 full-service centers will still be open nationwide. All told, HR services now available at 450 locations will expand to 700 sites once the kiosk network is up and running.

Critics, of course, have observed the irony of using technology to eliminate the jobs of employment counselors. But there's at least one small consolation for the soon-to-be-displaced workers. While the ranks of the unemployed may swell by 5,000, at least the newly jobless won't have far to go for help. ■

ILLUSTRATION BY FRAN O'NEILL

Total multi-vendor chaos incompatible protocols inflexible systems

inaccessible information limited scalability

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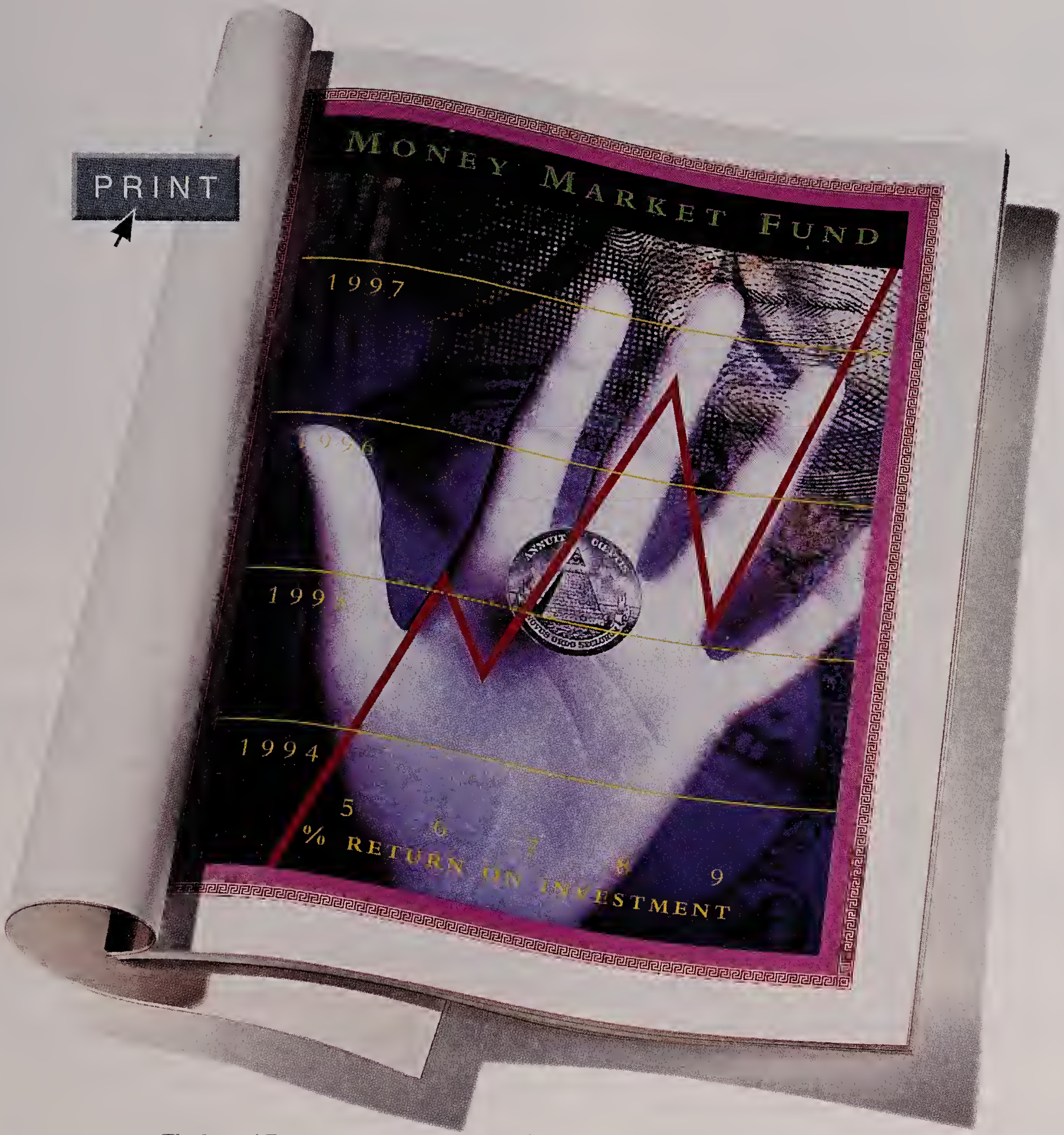

The line of Epson color printers starts at $449. Get one, get 720 x 720 dpi of Photo Quality Epson Color, and enter an age of experimentation, kaleidoscope color, unbridled creativity. (And you thought the '60s were over.)

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TRENDLINES

No More Teachers' Dirty Looks

In the past few years, teachers' jobs have been threatened by school closings and privatizations. Now, adding insult to injury, a college professor is claiming they're not even needed to grade papers anymore. A recent Associated Press article reports that Ellis Page, a professor of educational psychology at Duke University in Durham, N.C., has brought the world one step closer to a classroom without teachers by creating a software program that he claims performs as well as humans in grading essays. Page asserts that soon the work of evaluating students' essays can be shifted totally to the computer.

The software, called Project Essay Grade, or PEG, analyzed 1,014 essays written by college and postgraduate students, looking at things like sentence structure, vocabulary, length and spelling accuracy. Human teachers graded the same papers, and the program used those results to create rules for what confluence of elements made up an A paper, a B paper and so on. Now PEG can apply those rules to any and all papers, acting as an expert system that does away with the vagaries—not to mention time-consuming toil—of human input.

Not everybody is convinced that Page's software is a good idea. Critics argue that much would be lost by relying exclusively on a computer to grade papers. Computers cannot recognize irony, improper word choice, illogical analysis, humor or emotive power in writing. Nor do five-syllable words necessarily signify creativity or superior analysis.

But ultimately, the fiercest opponents of Page's software may be students. According to Page, this software will encourage teachers to assign extra essays since the burden of evaluating them will be shifted to computers.

EVENTS

Enterprise Expo 1995 and Mainframe Surround Solutions
Nov. 6–9
Navy Pier Conference Center, Chicago
Cardinal Business Media
214 669-9000

Partnering to implement enterprisewide solutions is the theme of this year's conference, which will give information systems professionals an in-depth look at the effective integration of client/server and mainframe legacy systems. Areas covered include IS management, database and application environments, networking and interoperability, data center operations and operating system platforms.

Registration: $995

Comdex/Fall '95
Nov. 13-17
Sands Expo and Convention Center, Las Vegas Convention Center and Las Vegas Hilton, Las Vegas
Softbank Comdex Inc.
617 449-6600

Comdex/Fall '95 will focus on the emergence of the personal computer as the principal device for controlling digitized information. The program highlights hardware and software developments, applications and operating environments, and marketing issues. Also featured are connectivity, new media and other online digital technologies. More than 2,000 companies will exhibit systems software, peripherals, accessories and services.

Registration: $695

CMA Telcom '95
Nov. 13-16
New York Hilton Hotel & Towers, New York
Communications Managers Association
201 425-1700

Strategies for connectivity is the conference theme. Individual programs will cover remote access, network connectivity, international communications and budget-conscious telecommunications management.

Registration: $100-$250

Leveraging the Customer Database in Financial Organizations
Nov. 15 & 16
Swissôtel Chicago
International Quality & Productivity Center
800 420-2145 or 312 977-0180

This conference will showcase financial institutions that are using their customer databases to improve customer service and better focus their direct marketing efforts. Conference participants will learn how to exploit their own databases to expand the bottom line.

Registration: $1,195

CORRECTION

In the "Accounting for Change" article in the August issue, we incorrectly identified the company that designed TRW Inc.'s client/server-based payroll system. It was designed by PowerPay Software Inc. of Rockville, Md., using software from Revelation Technologies Inc.

ILLUSTRATION BY BETHANY GULLY

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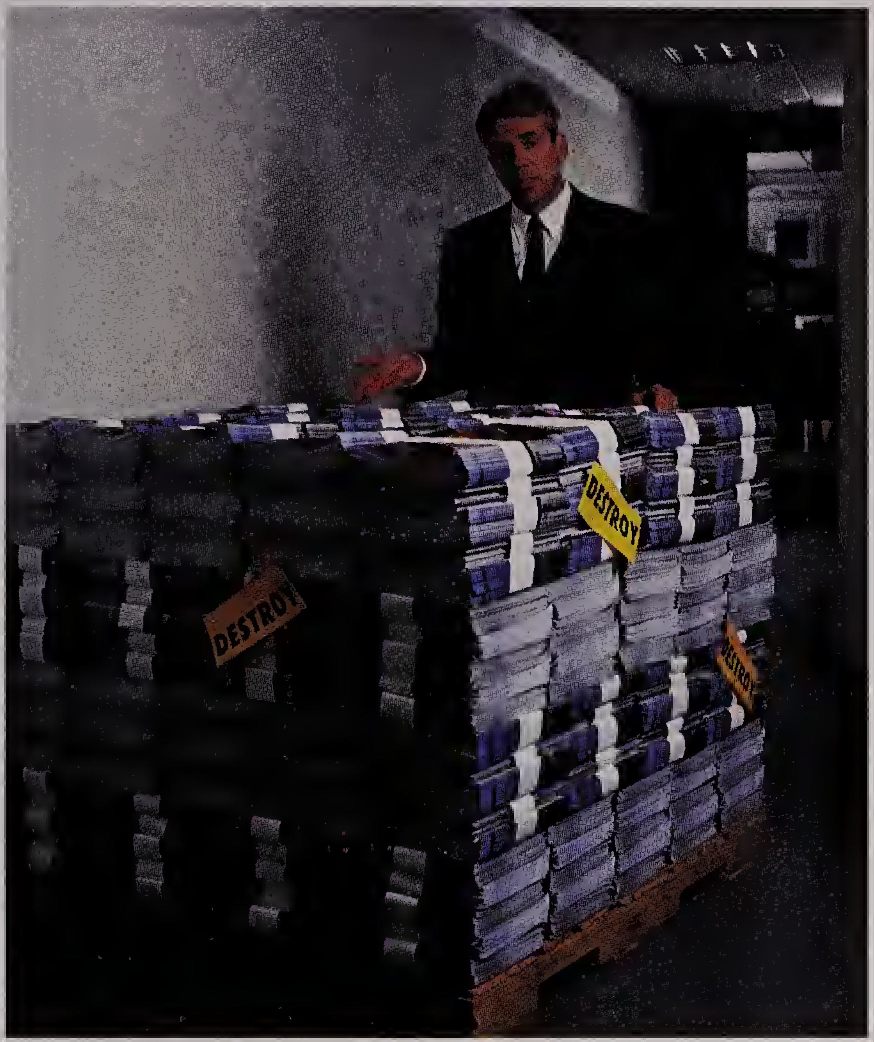

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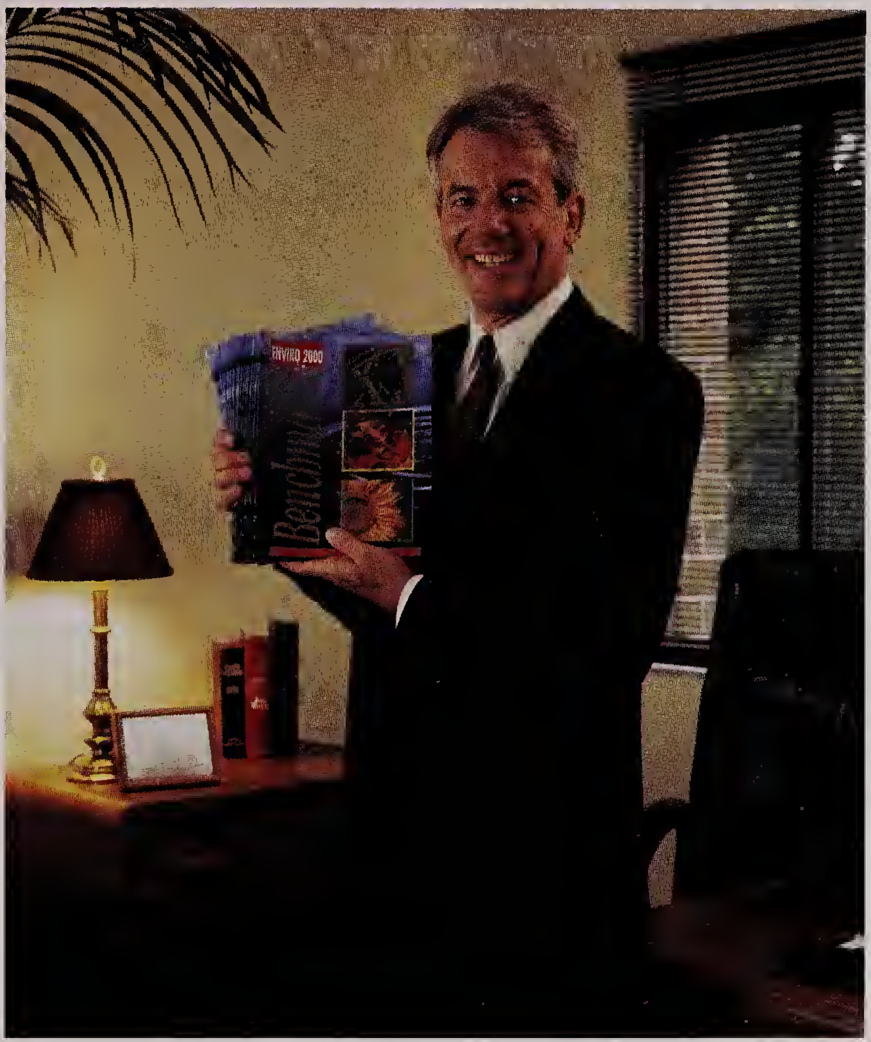

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TRENDLINES

VERSATILE VIDEO

What with all the media mergers these days, it seems like everyone's in the movie business. That includes military aircraft manufacturer McDonnell-Douglas Corp. and Hunter Engineering Co., a supplier of four-wheel alignment systems for the auto repair business. Both will soon offer digitized training videos created using a software-based MPEG encoding service from HEURIS/Pulitzer of St. Louis.

The service digitizes and compresses video materials in any format, allowing companies to put high-quality digital video into training materials, point-of-purchase displays, CD-ROM sales presentations, kiosks and other computer-based interactive applications. Because it relies not on application-specific integrated circuit (ASIC) chips but software that can be easily adapted to the needs of each job, HEURIS/Pulitzer claims the service offers extensive compression customization capabilities and superior output quality. It also enables video editing and compression in a completely digital environment.

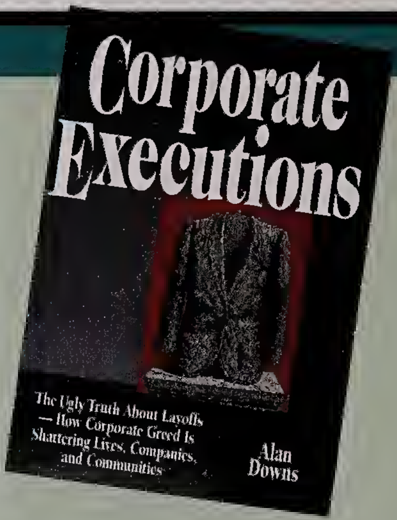
For more information, call 314 534-1514.

OFF THE SHELF

CORPORATE EXECUTIONS: THE UGLY TRUTH ABOUT LAYOFFS

HOW CORPORATE GREED IS SHATTERING LIVES, COMPANIES AND COMMUNITIES

By Alan Downs
AMACOM Books (New York), 1995; $22.95, 224 pages


Corporate Executions
The Ugly Truth About Layoffs — How Corporate Greed Is Shattering Lives, Companies, and Communities
Alan Downs

Had enough of the drivel about corporate America's new social contract with workers? Tired of all those employed business journalists telling you that you have to be prepared to become a flexible learner in the much-touted learning organization of tomorrow's virtual company?

Then this indignant exposé of the so-called layoff panacea to ailing market performance should appeal to you. It offers a welcome counterpoint to stories in *The Wall Street Journal* and even this magazine. Written by Alan Downs, a former industrial psychologist with a Silicon Valley high-tech company, *Corporate Executions: The Ugly Truth About Layoffs* is the mea culpa of a man who personally helped execute 400 layoffs. This insider's story recounts the late-night secret meetings among axe-wielding executives, the marathon layoff campaign carried out on "black Friday," the dismay at the end of the day to find that several of his own human resources people were also getting fired and the disillusionment six months later when the CEO quit with a whopping $4 million golden parachute—which would have more than covered the salaries of the fired employees.

For anyone eyeing the higher ranks, the book describes the often devious stratagems companies employ to get rid of extraneous senior executives. Some of these tactics may sound familiar: the bait and switch, raise the bar, reorganize, the impossible dream, rescope the job, slow death, total withdrawal and dead-end contract. For those at the top who have themselves indulged in these cutthroat politics, Downs has no sympathy. But when these strategies are applied to lower levels, Downs writes, then the resulting layoffs "can be the most psychologically and financially devastating of any."

Human resources, Downs' own profession, takes the hardest hit in the book, with the author likening that function to a corporate KGB. "Senior management has grown accustomed to using HR staff as hatchet men," writes Downs. "HR cannot play the role of corporate compliance *and* protection of employees.... Although the terms 'internal covert intelligence officer' and 'executioner' may be distasteful to all but the most unfeeling in HR, these are ongoing functions in the department."

But there is plenty of blame to go around. Wall Street analysts, who are swift to reward every major layoff announcement with "buy" recommendations and hence higher stock prices, bear some. Management consultants, particularly the reengineering gurus, and the news media also get fingered as "key enablers to the culture of narcissism...thriving in corporate America." As for the CEO responsible for making the decision to downsize, Downs points out that the more the CEO lays people off, the higher his salary.

The author admits that there are often sound business reasons for layoffs, but making the CEO richer is not one of them. Now a New Orleans management consultant, Downs hopes the book gets businesses talking about when layoffs leave too much to be desired. Alternatives to layoffs, such as pay reductions and controlled growth, deserve more attention, he argues.

For as Downs concludes, the unintended consequences of downsizing—to the corporation, to the individual and to the community at large—are more damaging than we yet know.

–E.B. Baatz

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Net Gains

With productivity up and spending on mainframes and leased lines down, Sterling Software has something to crow about

BY PHILLIP A. MOORE

Whenever I tell people that Sterling Software uses the Internet as the connective device for our corporate network, I am met with looks of bewilderment. I guess that reaction comes from the widespread view that the Internet has no utility beyond enabling users to browse for information, peruse the Web and exchange e-mail with people around the world. To most of my industry peers, the idea of using the Net as a corporate communications backbone is as foreign as space exploration was to Lewis and Clark.

Intrigued, most people press me for more information about this seemingly radical approach. Here are their most frequently asked questions:

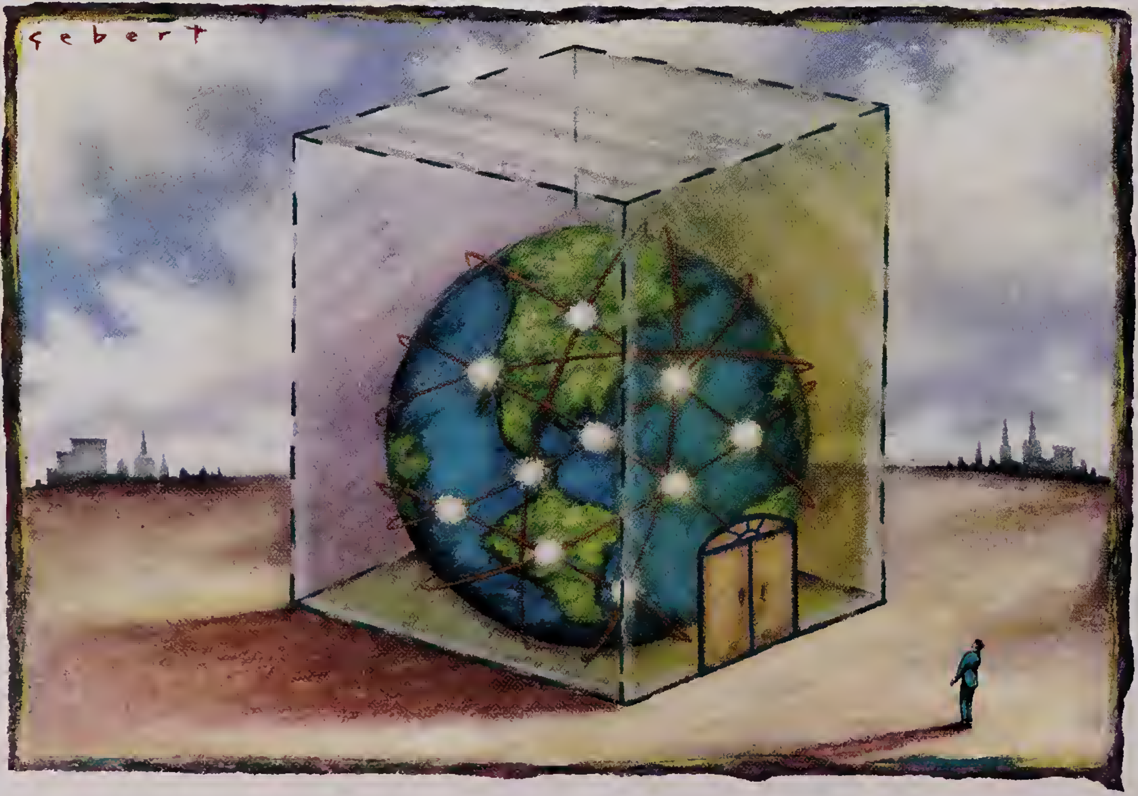
Has it worked?
The answer is an emphatic "Yes." Our success can be gauged by two measurements. First, overall productivity has taken a dramatic upswing since we began using the Net internally in 1993. To fully appreciate the improvement, you have to consider the way we used to conduct business among our offices.

Before we connected to the Internet, our corporate communications system was predicated on voice and fax connections afforded by telephone lines. While phone lines are reliable, our productivity was less than optimum because of time zone factors. Replacing a structure dependent on overnight deliveries, letters, phones and faxes has yielded obvious benefits.

Now, e-mails are delivered even if it's 2 a.m. at the recipient's office. A fax that might have languished on the receiving machine or become lost in a paper shuffle has been replaced by an e-mail going directly to the addressee's computer. And e-mails carry a sense of urgency that typically generates immediate action. As a medium for delivering information that needs a response *right now*, letters have been rendered obsolete.

The second measure can be found on our bottom line. By eliminating some mainframe hardware and using the Net as the foundation of our corporate network instead of dedicated leased lines, we have avoided spending about $8 million a year.

Why and how did you do it?
The "why" is simple. We had to replace the old system because we had outgrown it. By 1993, Sterling had expanded—primarily through acquisitions—into a company of more than 3,000 employees in 75 locations worldwide. With that many people in that many offices, timely communication was essential. Now that the Net is our conduit for communication, the assimilation of newly acquired companies, people and processes is simpler. And the Net's global presence makes connecting with new customers, partners and suppliers considerably easier.



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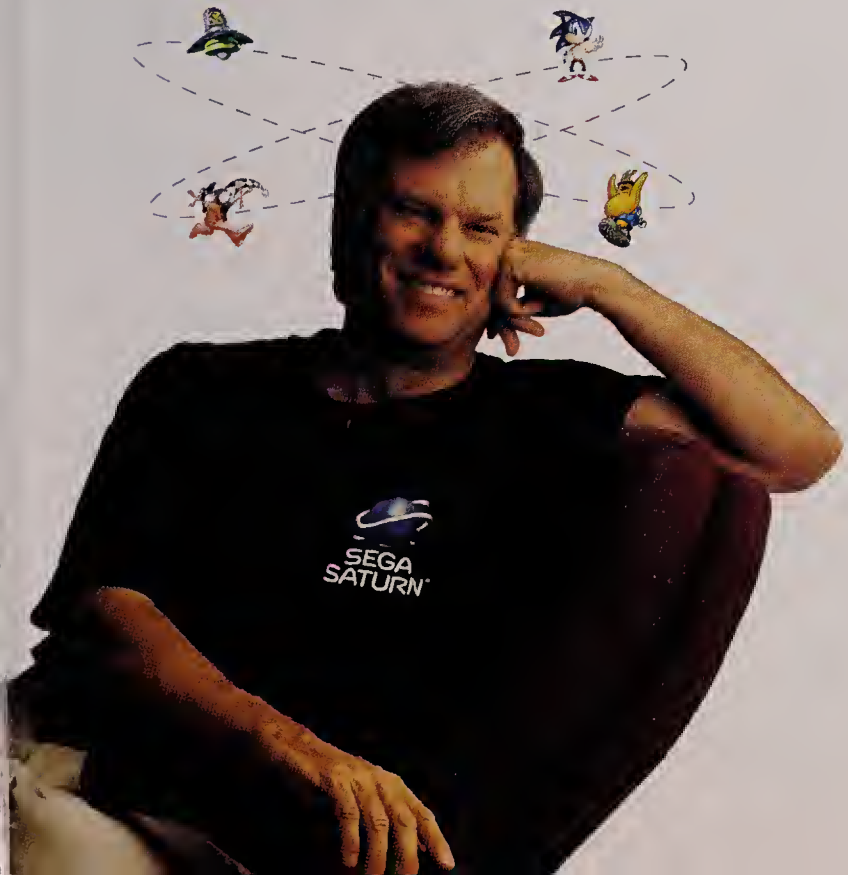

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We also had the experience to recognize the Internet's potential and the expertise to exploit it. The experience came from our association with the government: Sterling's Federal Systems Group works with the U.S. Department of Defense and other agencies that are using the Net as a communications medium. And as a software company, we had the advantage of already employing numerous experts in network connectivity.

The "how" is more involved. Once the decision to go with the Net was made, we assembled a team of systems integrators led by our resident Internet expert. After the necessary hardware and software were identified, ordered and delivered to a central location, the team split into two parts to install the new system. One unit remained at the location where the equipment was received and configured the components into turnkey systems that were shipped to individual offices. The other part of the team traveled from office to office, fine-tuned the turnkey systems, connected the internal network to the Net and completed our global link.

We had no set-in-stone order for which offices to connect first. Rather, those decisions were based on the order in which the equipment—specific to each office's internal computing environment—was received. Other factors included travel schedules and the availability of Internet entrance ramps near individual offices.

Were there any problems?

While the project went smoothly for an undertaking of its size, it was not without its hiccups. For example, when Sterling acquired Systems Center Inc., a company specializing in data communications and systems management software, we gained an office in Sydney, Australia. Unfortunately, Australia was at that time one of the only countries without a commercial Internet service provider. The integration team worked around this obstacle by using the leased line between the Sydney location and our office in Reston, Va. (the former corporate home of Systems Center), which was connected to the Net.

The same firewall that prevents unauthorized access from outside also shuts down nonbusiness wanderings by company personnel.

Is it secure?

If we had doubted, for one minute, our ability to provide a completely secure environment, we would have scrapped the project immediately. In hindsight, connecting our offices through the Net was the easy, tactical part of the job. Designing and producing a security system was the more difficult, strategic task.

We did, however, hold a trump card. At the time we began devising our Internet plans, the only available firewalls were a hodgepodge of mismatched pieces. But the government has been concerned with security longer than most businesses, so we were able to draw on the data security experience we gained working with government agencies.

The term "firewall" has been used to describe everything from router- or packet-filter-based systems to software that shuts down one network's access to another at a specified time or signal. But a true firewall must be an application-level enterprisewide gateway manager. Building on that, we adopted the rule that "whatever network query is not expressly permitted is emphatically denied."

Our network security system, covering 38 gateways, now consists of a fully integrated gateway manager that includes access control, protocol proxies, and logging and notification alerts. We have also added e-mail administration, a configuration-validation toolkit and name-server administration. Because the weak link in any network is human error, our designers and senior administrators developed a comprehensive training program for the system, including a week-long boot camp for everyone responsible for network administration and security.

The result? A system that has protected our network 100 percent.

Don't employees waste time surfing the Net?

The Internet offers an abundance of interesting—but non-work-related—attractions. When employees recognize the vast amount of information suddenly available at their fingertips, the desire to venture beyond the boundaries of business-pertinent Internet sites may become too great to resist. To eliminate this potential drain on productivity, the same firewall that prevents unauthorized access from outside also shuts down nonbusiness wanderings by Sterling personnel. (Acceptable business locations are predetermined; anything else is not allowed.)

Should my company use the Internet the same way?

That's the one question I can't answer definitively. The Internet offers unique opportunities for intra- and intercompany connectivity. But unless an organization has a genuine need to change its communications medium, there's no need to integrate a public network just because it's there. The benefits are tangible, but the risks are just as real.

Should the decision be made to ride this cresting wave of global connections, company officials and network administrators must first develop a security strategy, then enlist the services of experienced hardware and software companies, as well as a reputable Internet access provider. With a proper security plan, the right equipment and the support of the business units, companies can achieve a global data communications infrastructure that is a success on all levels. CIO

Phillip A. Moore (phil_moore@sterling.com) *is the co-founder, executive VP of technology and CTO of Sterling Software Inc., a worldwide provider of software products and services for electronic commerce; applications and systems management; and technical solutions for federal government.*

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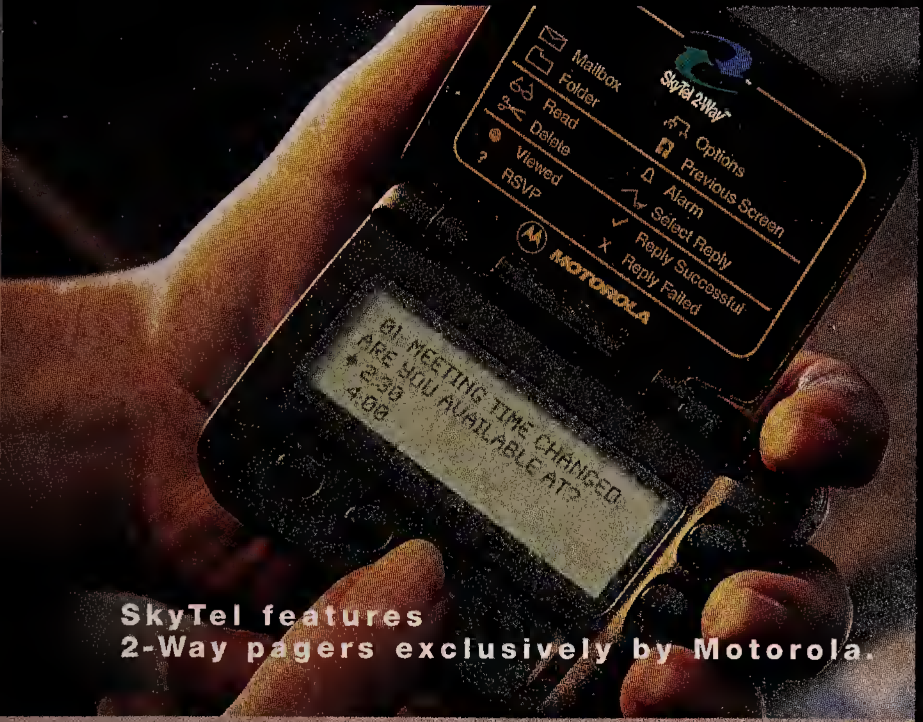

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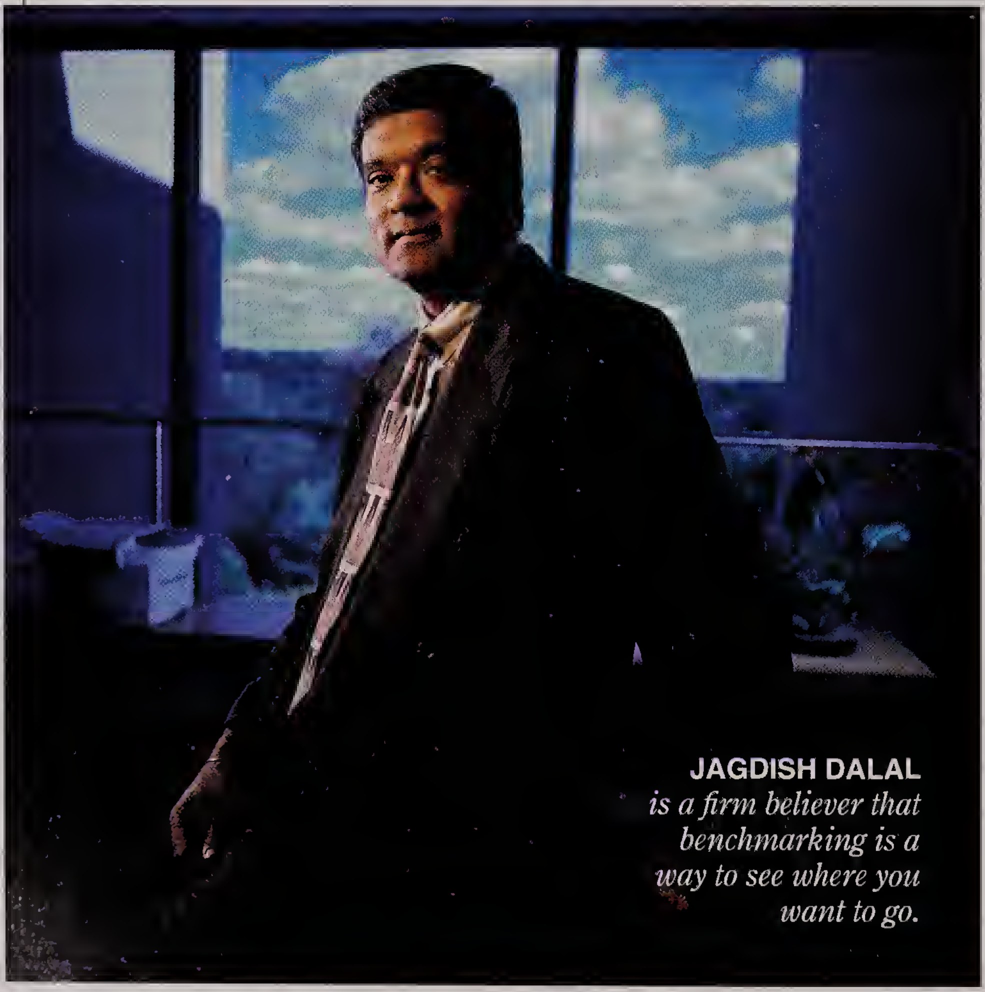
Benchmarking *Comes of Age*

Early adopters of benchmarking, along with more-recent practitioners, offer insights on the current state and future applications of this maturing IT management tool

BY RICHARD PASTORE

CRITICAL BACKLASHES ARE NATURAL HAZARDS FOR ANY much-hyped management technique; even Michael Hammer still hits the mat to defend his reengineering concept from time to time. Benchmarking, too, has endured its share of gainsayers. People couldn't even agree on a definition for the b-word when it first broke headlines in the late 1980s.* Today, the definitions seem to have settled out, along with former fears that the practice would sanction corporate espionage. But further questions remain for information systems departments using benchmarking to evaluate their performance: Can it be truly strategic? How does one ensure follow-through and implementation of findings? Is the expense justifiable? And most important, can benchmarking be used to show how effectively IT contributes to business success? To find out, *CIO* revisited the concept with a group of early adopters and more-recent practitioners. Their answers lay some concerns to rest, offer insight into how to manage others and point the way to a new application for this maturing business improvement tool.

One of the raps benchmarking has endured is that, by its nature, it is imitative rather than innovative. Strategy scholars argue that if everyone simply mimics each other without innovating, eventually they will all reach a plateau of operational effectiveness without any having obtained a distinct advantage. In theory, the critics have a valid point. But that logic has less applicability in the real world, benchmarking practitioners agree.



JAGDISH DALAL
is a firm believer that benchmarking is a way to see where you want to go.

PHOTO LEFT BY EDWARD SANTALONE; PHOTO RIGHT BY KENT SIEVERS

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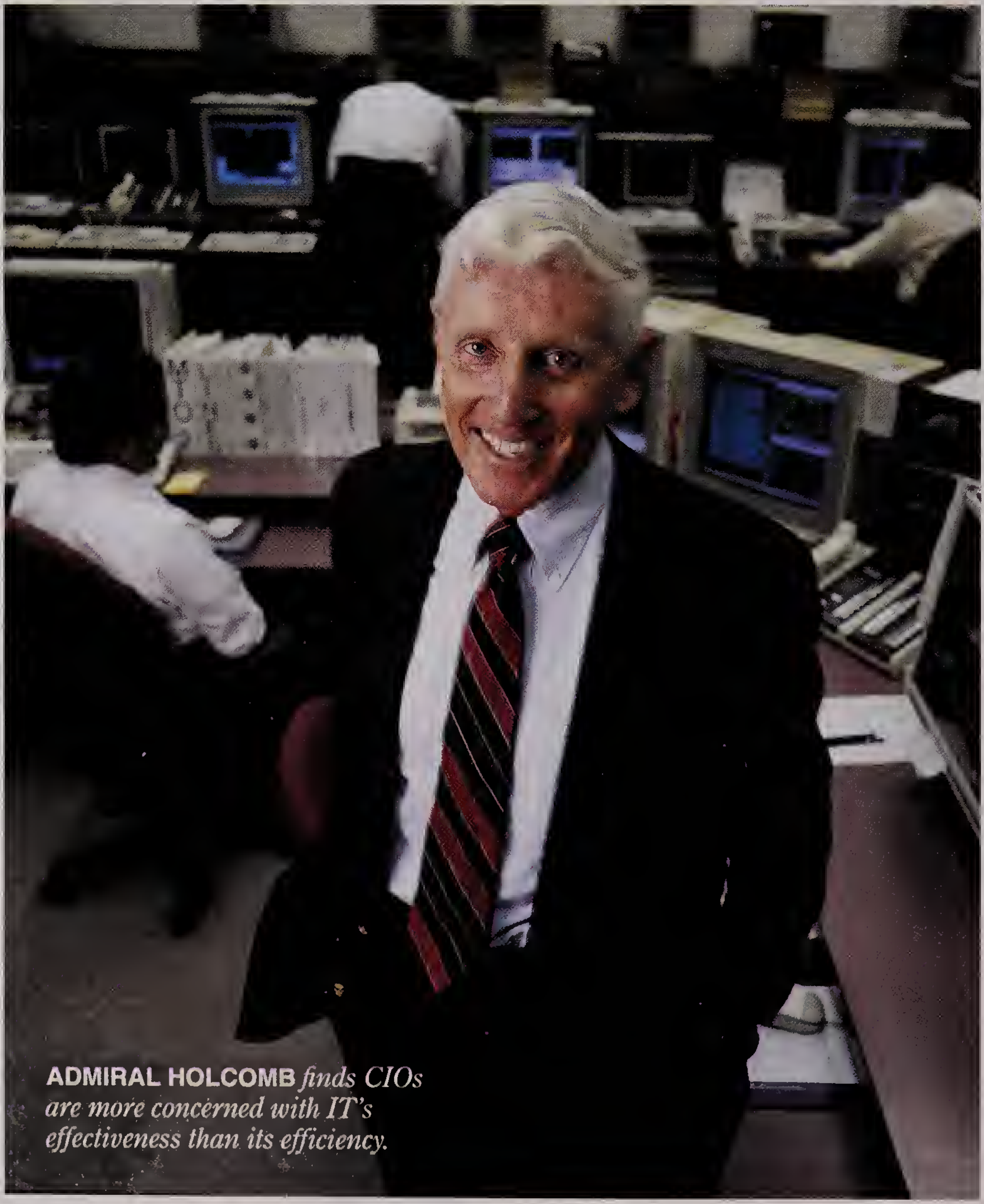
* *We define benchmarking as a systematic process for evaluating and comparing business services, products and work processes in order to facilitate improvement or strategic advantage.*

JOYCE WRENN
sees process benchmarking as key to the IS function's competitive value.

"It's true that all the companies we benchmark with are getting better, so the gaps revealed are getting smaller," says Steve Lanzl of veteran benchmarker E.I. du Pont de Nemours & Co. But when one benchmarked area reaches a point of diminishing returns, there's always another area ripe for dramatic improvement. "The number of things you can benchmark is infinite," asserts Lanzl, manager of IS planning and analysis for information systems.

One might expect the company benchmarking guru to extol its virtues out of self-preservation, but IS chiefs with less vested interest in the practice vouch for its strategic value as well. "We're a firm believer that benchmarking is a way to see, not just tactically but strategically, where it is you want to go," says Jagdish Dalal, vice president of information management and corporate director of global integration and delivery at Xerox Corp. In fact, benchmarking was a foundation for the company's major information management strategy of the 1990s, "IM 2000," which led to the mammoth IS outsourcing arrangement with EDS.

It's typical for user department managers to initiate process benchmarking, which increases the chance that IT components will be overlooked or given short shrift.



ADMIRAL HOLCOMB *finds CIOs are more concerned with IT's effectiveness than its efficiency.*

PHOTO BY JOHN DYER

Ensuring that benchmarking efforts pay off strategically remains a challenge, however, particularly for newcomers to the concept. Experience is paramount in order to reach beyond operational improvements toward strategic value, according to Tim Gaffney, former manager of IT products and now alliance services development manager at Ameritech in Hoffman Estates, Ill. The regional Bell operating company, which is trying to become a broader telecommunications player, has so far achieved marginal competitive advantage through IT benchmarking. As is common among less experienced practitioners, Ameritech had until recently focused mainly on measuring operational performance, without digging deeper into the underlying IS processes—which is where the strategic gold lies.

In fact, in the formative days of benchmarking, IS metered its operations ad nauseum: data center costs per MIPS, programmer costs per line of code, systems analyst costs per peanut butter sandwich consumed. These efforts were fine for rating IS efficiency. But gradually, IS process benchmarking gained a foothold, allowing exploration of such wider (and more strategic) issues as reducing development cycle times, building the IT infrastructure and distributing software in a client/server environment.

Joyce Wrenn, CIO of Union Pacific Railroad in Omaha, Neb., sees value in both types of measures. "The numeric operational benchmarks show me the overall efficiency and productivity of our people. They are useful at budget time to present to corporate management," she says. She sees process benchmarking as an effectiveness tool, key to the IS function's competitive value. "We're looking now at how to improve our interface with internal customers to increase effectiveness; I don't equate that with efficiency or productivity."

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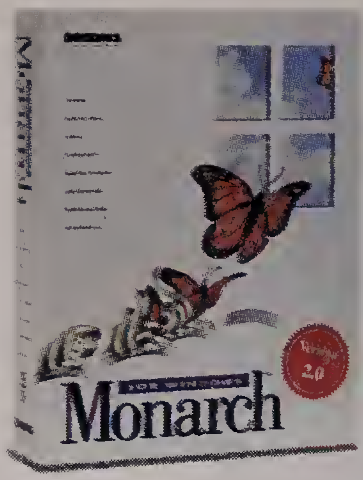

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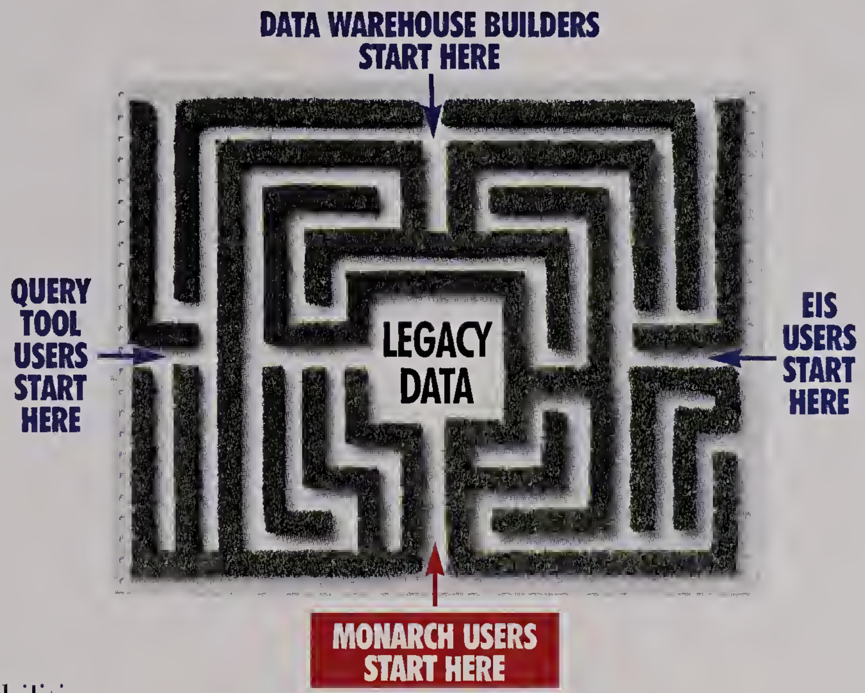
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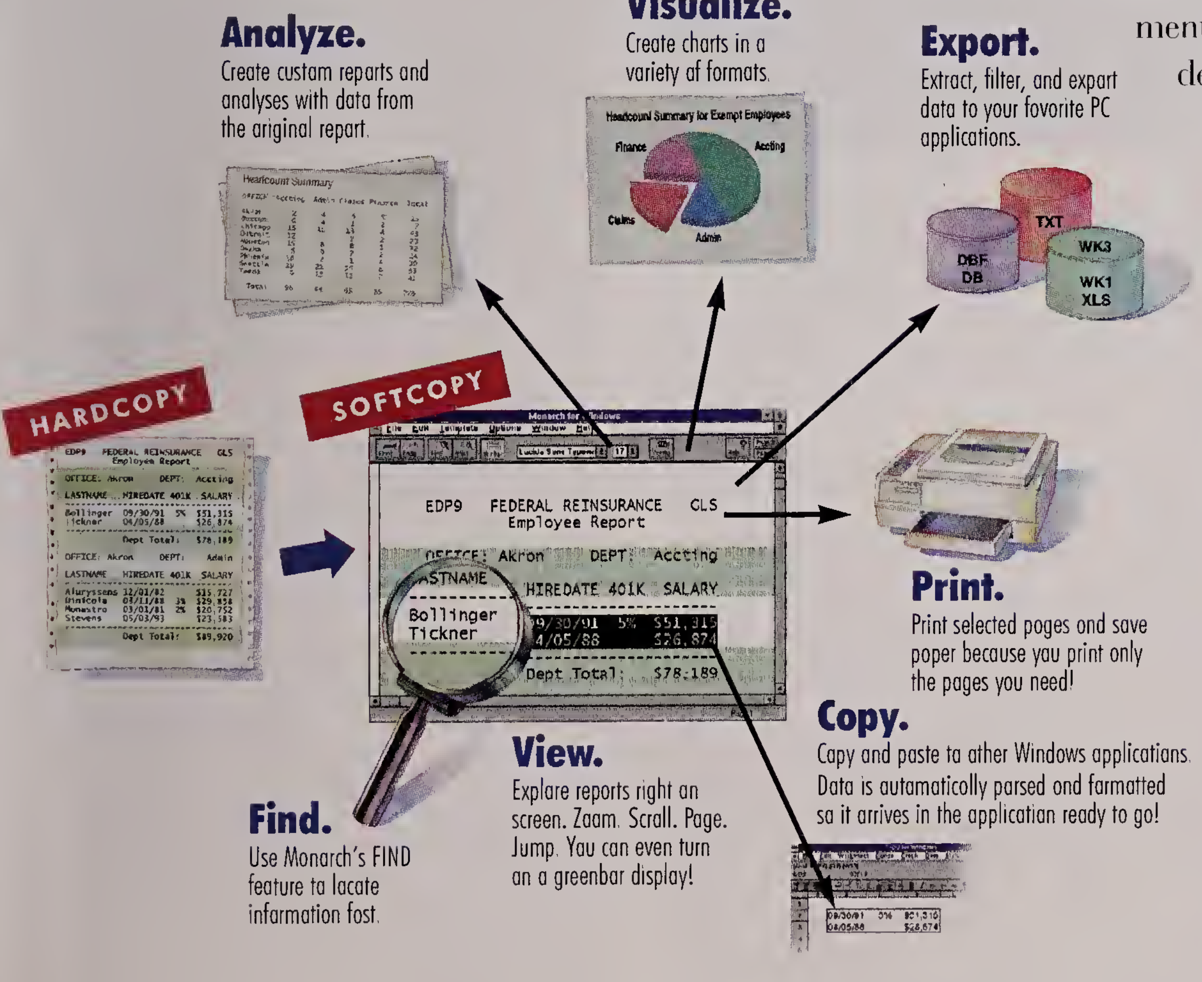
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Tickner     04/05/88        $26,874
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            Dept Total:     $78,189

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LASTNAME    HIREDATE  401K   SALARY
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Aluryssens  12/01/82        $15,727
Dinicola    03/11/88   3%   $29,858
Monastro    03/01/81   2%   $20,752
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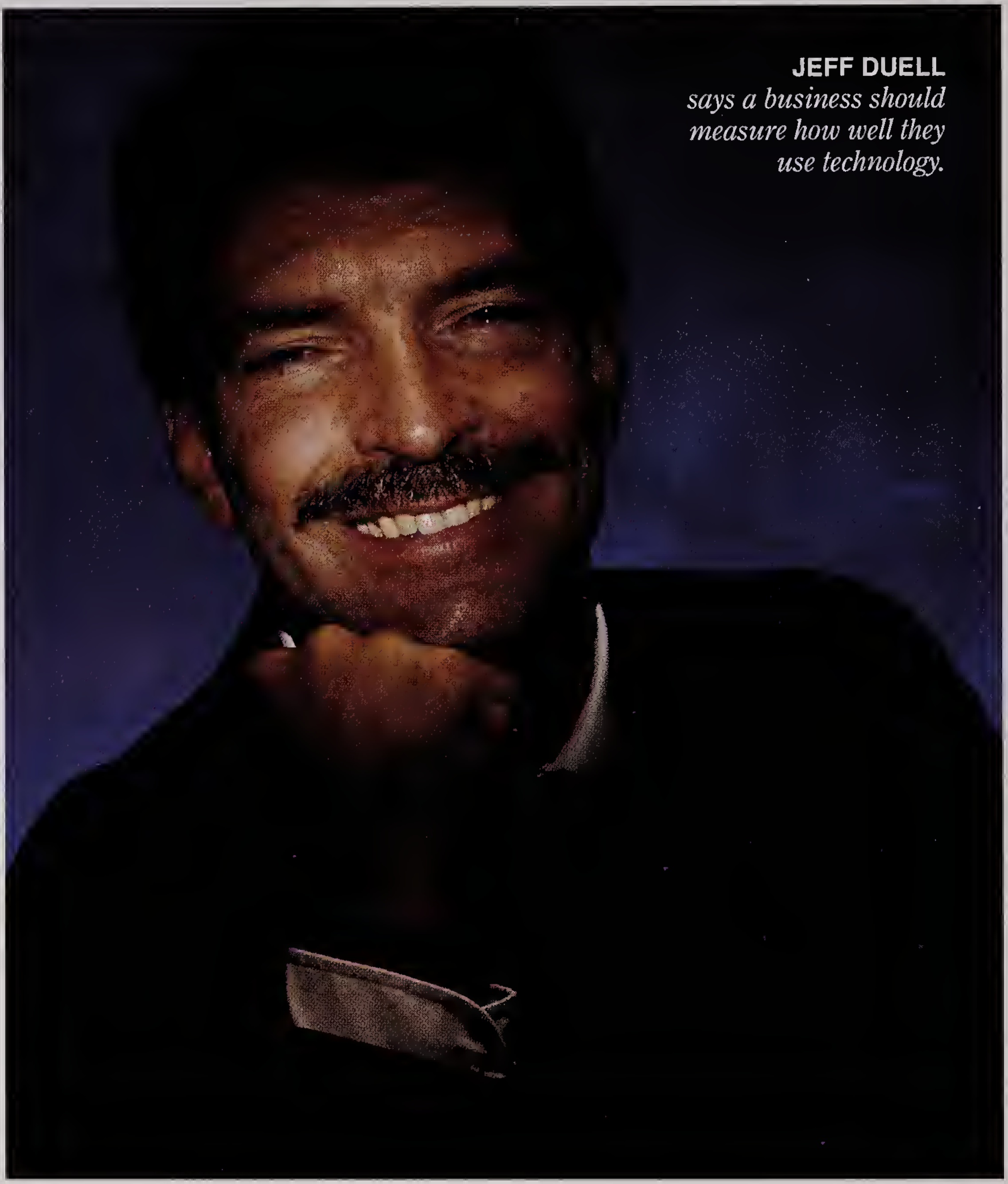


JEFF DUELL *says a business should measure how well they use technology.*

PHOTO BY FOREST MCMULLIN

Strategic process benchmarking has captured the lion's share of interest at United Services Automobile Association (USAA), the San Antonio insurance and financial services firm. "IT efficiency is important, but it isn't the thing that's perplexing most people," says Admiral M. Staser Holcomb, USAA executive vice president and CIO. "Most of the CIOs I talk with are far more concerned with the effectiveness of IT's application to business problems."

If anything, this rate of concern will escalate as CIOs start to recognize the need to benchmark how well users leverage IT tools and services to do *their* jobs better. That's the next frontier, practitioners say—studying IT's contribution to users' business processes. It promises to yield the best answers yet to that ultimate question: How effective is IT in furthering the business goals of the organization? Knowing the answer would make it vastly easier to steer IT investment dollars toward increasing profitability, market share or revenue.

The distinction between benchmarking IS internal practices and studying IT-enabled user processes can be seen in a recent experience of longtime benchmarker Eastman Kodak Co. A manufacturing unit's managers initially felt they should benchmark their decentralized IS group, targeting issues like productivity, support and client/server practices. As it turned out, they really needed to know how well their business processes were being supported by IT. "They had to convert their thinking in order to study how other manufacturing units effectively used IT to create high performance," says Jeff Duell, Kodak's coordinator of IT quality and benchmarking. "More and more, it's not the IS function we want to benchmark. It's how well the unit uses technology."

Another example: IBM Corp. recently got together with partner Sun Microsystems Inc. to compare the use of IT in human resources and finance management. In asking how Sun handled personnel time recording for professionals, IBM learned that Sun doesn't bother with it at all. The discovery led IBM to dissolve the practice in the United States. "We came back with a proposal for the CFO that showed we could stop doing it and save millions," recalls Frank "Skip" Jahn, program manager of information technology. A more traditional, IS-centric approach would have sought out benchmarking partners using time-recording technology and would not have yielded such a fundamental business-process insight.

Many of the challenges of this type of benchmarking are associated with dabbling in another department's processes. It's a far cry from studying IS's own internal practices, such as systems development, over which the CIO has total control and influence. Benchmarking processes in the user domain requires a more external perspective and cooperative approach. "You have to scratch your head and think about your group within the framework of the entire company," Wrenn says. "That takes a bit more digging."

At IBM, it's most often the various business unit CIOs or their staffs who launch studies of IT-enabled user processes. The organizational structure deliberately shields these IS leaders from back-room concerns, allowing them to focus on the processes of their units. At other companies, however, it's more typical for user department managers to initiate process benchmarking, which increases the chance that IT components will be overlooked or given short shrift. This can be frustrating for CIOs who want to add value by leading business-process improvement initiatives. Lanzl notes that DuPont's business unit IS managers haven't initiated as many studies as they'd like but that they hope to do more as their business expertise grows.

How can CIOs be more proactive in this type of benchmarking? First, they must overcome any hesitancy in poking through the processes of other departments and companies. "They have to grow comfortable with looking at things outside their obvious environment, to see if others are succeeding in applying technology," says Christopher Bogan, president of Best Practices Benchmarking & Consulting Inc. in Chapel Hill, N.C. Once the initial study is complete, IS must continue to carry the ball. That means modeling the impact of new pieces of IT—calculating the costs of the technology, training and maintenance—and projecting the savings or revenue they will create for the business. To accomplish this, IS leaders must either have an integral knowledge of the affected business processes or recruit the help of user management—or both, Bogan recommends.

However CIOs manage it, they had better do it soon. More and more, CEOs are turning up the pressure for an accounting of IT's business contribution. "When my CEO comes to me, what's behind his question isn't primarily whether Allstate Insurance Co.'s IT is more efficient than ours," says USAA's Holcomb. "His question really asks, 'How well are we working with the lines of business to define a new standard for the services we want to offer?'"

Even as new challenges like this surface, more traditional benchmarking hurdles remain. Key among them is the need to ensure follow-through and implementation of the knowledge and ideas gleaned from the exercise. Any CIO who's ever rushed back from a conference bursting with ideas only to be sucked back into the vortex of the day-to-day knows how tough that can be. Texas Instruments Inc., for one, is not leveraging as much of its benchmarking findings as it would like, according to Cindy Johnson, manager of the office of best practices for the Dallas-based company. "Last year, we recognized the need to reorient ourselves from trying to gather as much external information as possible to focusing on the highest priority areas and making sure to implement what we learn," she says.

IBM, too, has bumped up against the implementation hurdle. "Communicating the good things we learn and following up is something we have tended not to do for information that is more anecdotal than quantitative," Jahn says.

Among the techniques that can help ensure follow-up are knowledge repositories, step-by-step procedures, a high degree of CIO involvement and manager accountability. Texas Instruments has started cataloging the findings of benchmarking studies in a Lotus Notes knowledge base stewarded by 120 facilitators scattered across all business units. The facilitators search the knowledge base for ideas that can be implemented by business unit managers looking to strengthen weak areas or otherwise improve their operations. By December, the information will be more accessible internally via a World Wide Web connection, according to Johnson.

Kodak has regimented its benchmarking operation to orchestrate follow-through and implementation; they are steps nine and 10 of an 11-step process. But couldn't someone just give up and quit at step six or eight, forgetting about follow-through? That's not a danger when management sees the benefits of taking those final steps, Duell contends. "But you have to build in that leadership commitment from the beginning—that's step one of the process."

High-profile involvement of top IS brass lends implicit muscle to the call for follow-through. At IBM, Vice President and CIO Gerald

THE OUTSOURCED BENCHMARK

A number of avid information technology benchmarkers have also come to embrace IT outsourcing. We wondered if this added an unusual spin to their benchmarking efforts and asked them to explain.

Eastman Kodak Co.
Jeff Duell, coordinator of IT quality and benchmarking:

"Our outsourcing arrangement presents a unique situation in which to conduct benchmarking. There's a little more sensitivity around some of the cost data; the service provider might be reluctant to yield cost data to third-party consultants who benchmark their performance for us. We've done fairly well at getting that information, and now we're working on putting together improvement procedures.

In most cases, the outsourcer owns the processes that may be affected by benchmarking recommendations. We can influence the outsourcer, but they must come to the realization that they have to improve their performance for us. We have to work together to ensure that the improvement projects are undertaken."

Xerox Corp.
Jagdish Dalal, vice president of information management:

"It doesn't change anything except that you need your outsourcing partner, in our case EDS, to work with you in benchmarking. That's easy to do if you make benchmarking a requirement for your partner. It's a contractual arrangement that they entertain improvements suggested by benchmarking. EDS bought into it from the beginning."

IBM
Frank "Skip" Jahn, program manager of IT:

"We look at IBM's ISSC unit as our outsourcer. We compare their rate structure to other vendors to make sure we get a good deal. If we see that changes are needed, it's easy to get them to bring improvements to the table. But it's no easier than for other customers who are footing a very large bill. We look to ISSC to work as a partner to improve the IBM company."

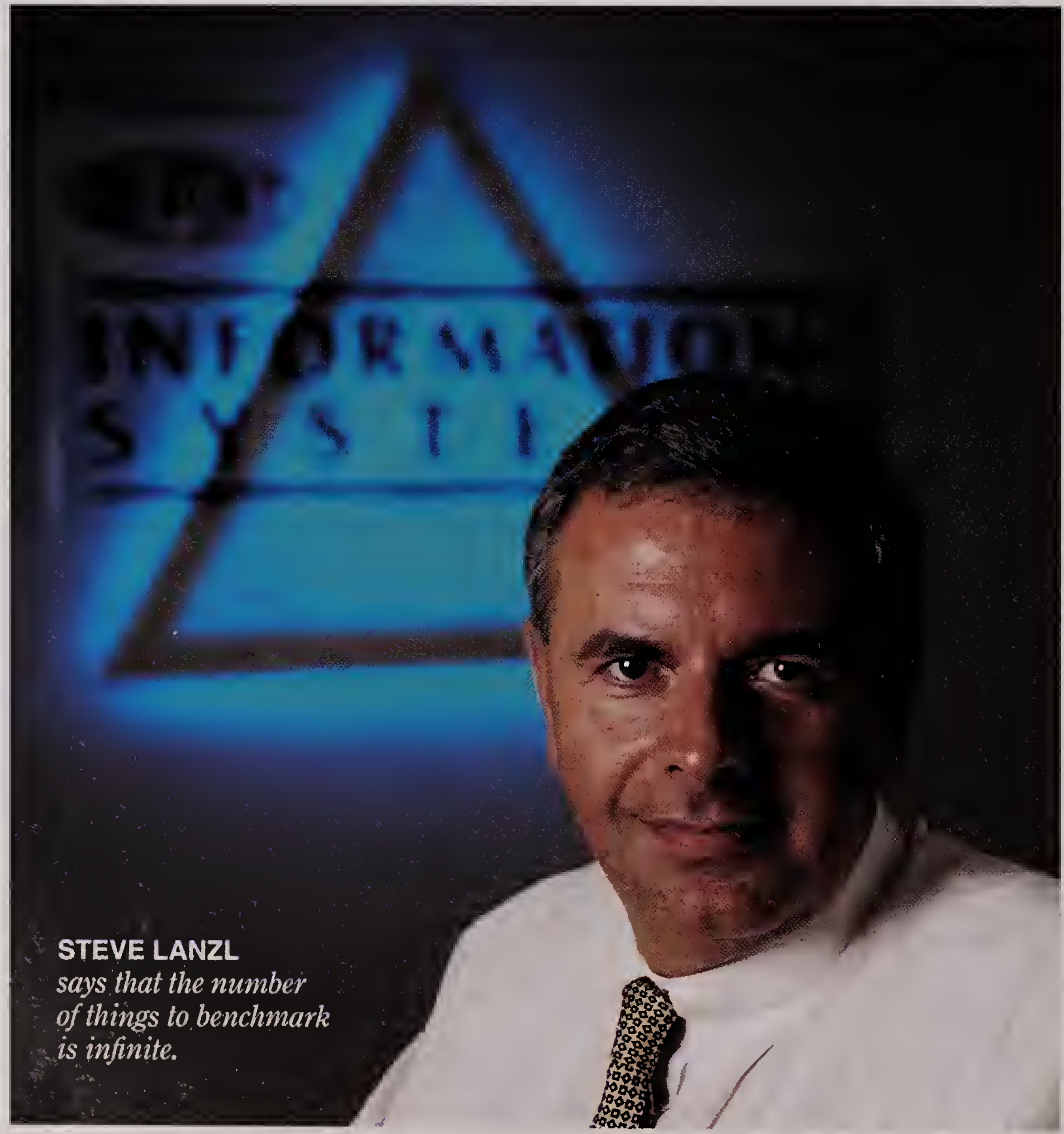
–R. Pastore

Prothro's staff maintains several databases of benchmarking information, which he regularly shares with two management councils he chairs, according to Jahn. DuPont CIO Cinda Hallman uses benchmark data almost daily in presentations to top management, who are continually curious about how their IS components compare, Lanzl notes.

If this type of persuasion is too subtle, companies might try holding managers accountable. Union Pacific develops action items and assigns responsibility and deadlines for carrying out benchmark-generated improvements. Implementation becomes part of the business objectives, which translate into employees' own job objectives, Wrenn explains.

Are the costs in time and resources justified by the payback? The question seems largely rhetorical these days; veteran benchmarkers say they rarely tally it.

How far should a company go in mandating follow-through—or benchmarking at all, for that matter? Are the costs in time and resources justified by the payback? The question seems largely rhetorical these days; veteran benchmarkers say they rarely tally it. "I couldn't begin to tell you the costs because it is so interwoven with our continuous improvement approach," Holcomb says. As of this summer, USAA had some half-dozen full-blown IT benchmarking efforts underway, plus another two dozen informal studies and three business-process reengineering projects that included benchmarking components.



STEVE LANZL *says that the number of things to benchmark is infinite.*

PHOTO BY EUGENE MOPSIK

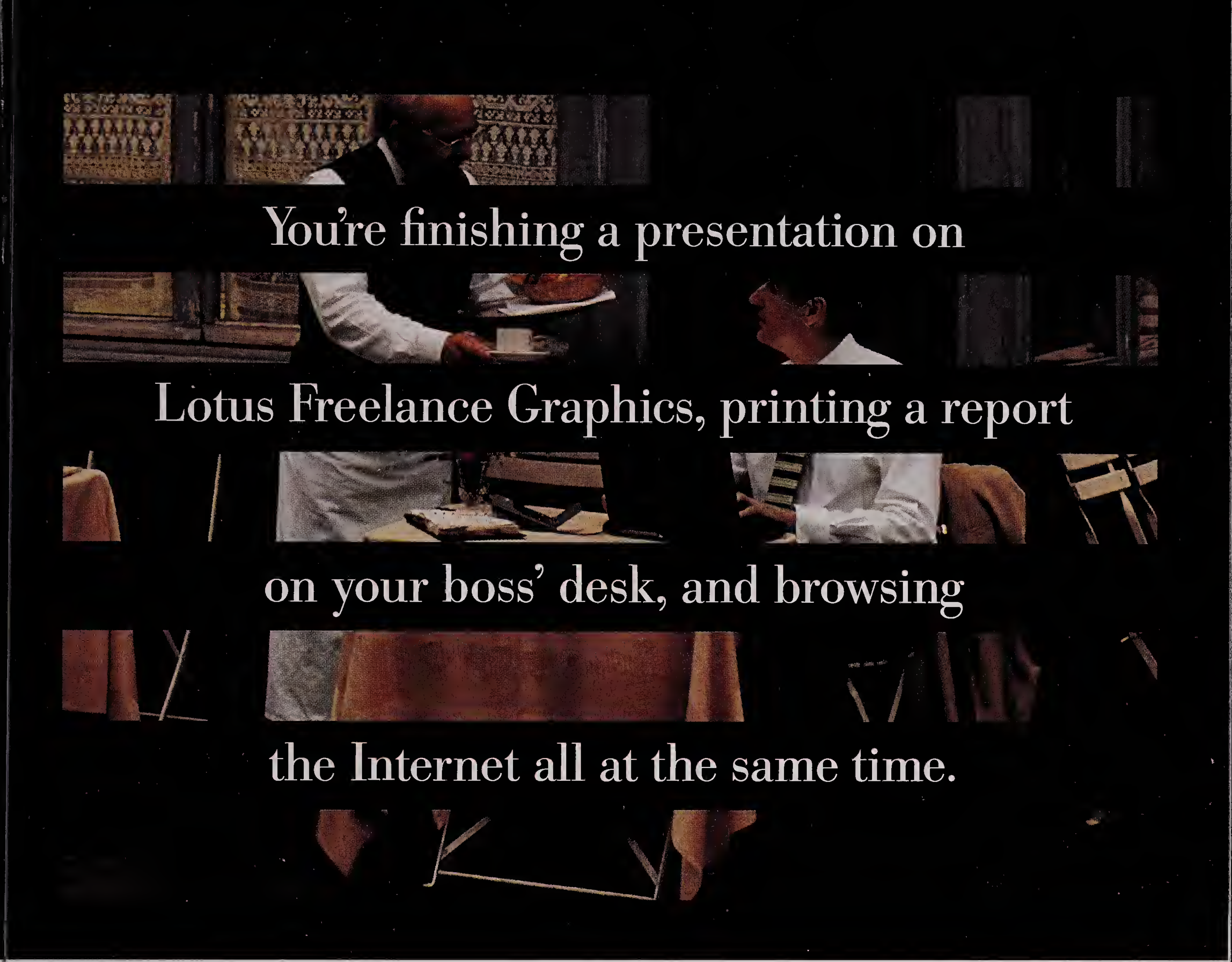
Others see little point in quantifying returns on what they know is a good investment. "I didn't make a business case as such; I just felt that it was a good thing to do," Wrenn says. "I contrasted it with where I could put an equivalent amount of money to get us where we're trying to go, and I felt it was a very good investment."

The fees of benchmarking consultants and vendors are the easiest to separate out and quantify—and they can add up. DuPont has used CogniTech Services Corp. of Columbus, N.C., a consultancy that benchmarks IT's business-process contribution. CogniTech charges $15,000 for one unit of analysis. IBM Consulting's IT Transformation Consortium, which has run IT benchmarking programs with Union Pacific and others, charges $125,000 to join.

But companies can eventually dispense with some third-party charges as they gain the experience to conduct studies without hired help. As companies become familiar and comfortable with the practice, organizations are better able and more willing to participate in quick, cheap studies conducted via telephone or mail surveys. "It doesn't have to cost a lot to do benchmarking right," asserts Gary Pollard, total quality director for TI's information systems and services group. "We recently visited with three companies for a chargeback study, but we benchmarked with 20 by telephone using a survey we developed."

No matter what the cost, Texas Instruments and its fellow practitioners affirm the value of IT benchmarking. "We continue to do it because our management team truly believes it's the only way they will achieve their growth goals for this company," Johnson says. "Our CEO says we cannot afford to mind our own business." CIO

Richard Pastore can be reached at pastore@cio.com.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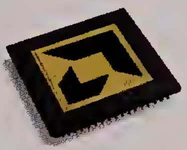
The Kentucky Derby. The Preakness. The Belmont Stakes. The first horse in 25 years to sweep the Triple Crown. If you'd only known. Well, know this: Advanced Micro Devices is the world's second-largest producer of microprocessors. For 26 years, we've delivered premium performance without a premium price. And now AMD is launching the next generation K86 Superscalar™  family of Microsoft Windows® compatible micro processors. This technology will dramatically change the nature of competition in the PC industry. Innovation like that could bring you quite a payoff

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DAVID KING:
"A warehouse is only as good as the data that gets fed to it."

Form *follows* Function

The construction of a data warehouse begins with careful attention to the overall architecture. The builders must figure out which data they want to access, in what form and how it will flow through the organization. The technology decisions should wait.

BY CAROL HILDEBRAND

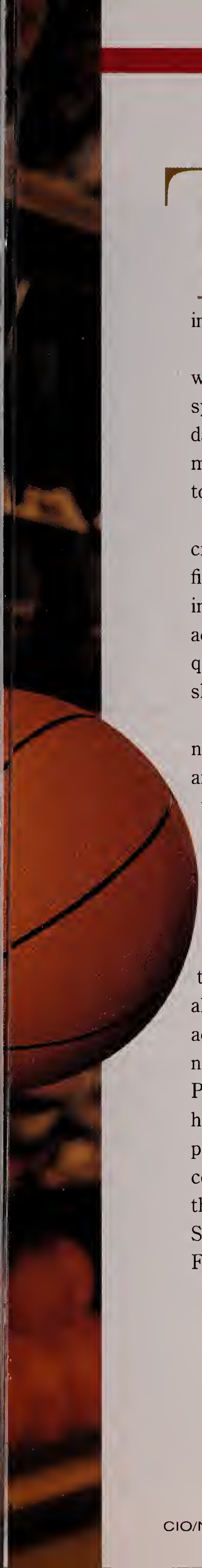


PHOTO BY ANDRE SOUROUJON/FIRST LIGHT

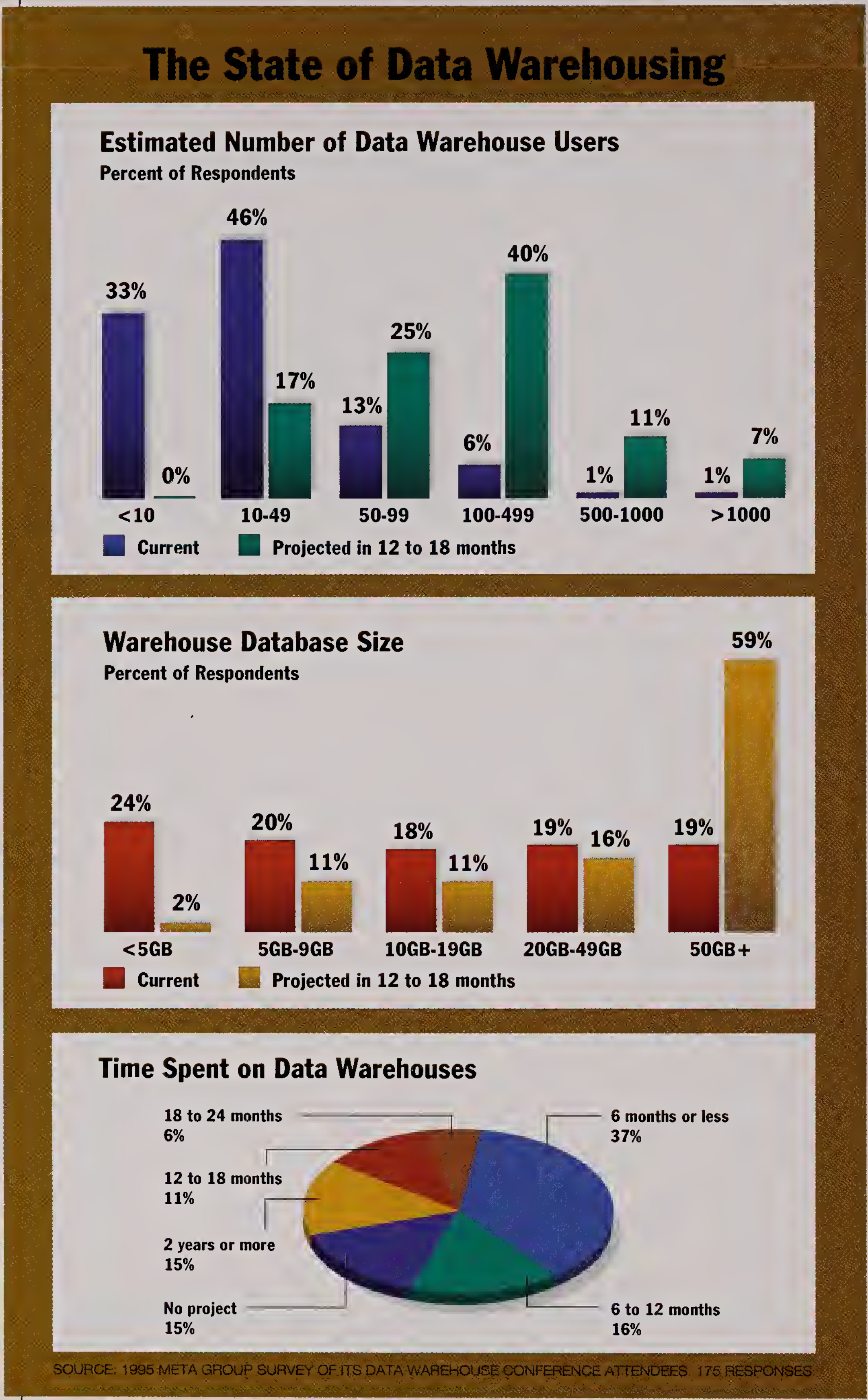
THERE WAS A TIME WHEN LOOKING for data bore more than a passing resemblance to searching for that last pair of matching socks in a messy bureau drawer. You know they're in there, but poke and dive as you will, the chaos within prevents the extraction of a matched set of hosiery.

Such is the frustration of information searchers confronted with corporate information residing on mainframe-based systems. Somewhere, on any number of these "production" databases, lies the raw data with the potential to yield informational gold nuggets through business analysis. But how to get at it?

The hot trend is to pull information off these systems and create "data warehouses." These are relational databases filled with large volumes of cross-indexed historical business information—from inventories to product orders to financial accounting data—that users access with desktop-based query tools. Business types can gain analytical insights by slicing and dicing the information to their hearts' delight.

In order for this to work, however, warehouse builders need to pay as much attention to the structure, definition and flow of data as they do to choosing hardware and software. "It's like building a house," says Jack McElreath, a managing partner of CSC Consulting's Waltham, Mass., consulting and systems integration unit. "You've got to separate blueprints from whether you're going to put in hardwood floors or carpeting."

When built correctly, a warehouse can produce insights that yield bottom-line-boosting results. For example, by analyzing buying patterns at the individual transaction level, one retailer discovered that many new fathers picked up beer along with the Pampers on their Friday night forays for household staples, says Richard Finkelstein, president of Performance Computing Inc., a consultancy in Chicago. So the company put the two items on adjacent shelves. The result: Sales of both products went up by 30 percent, Finkelstein says.



The State of Data Warehousing

Estimated Number of Data Warehouse Users

Percent of Respondents

Warehouse Database Size

Percent of Respondents

Time Spent on Data Warehouses

SOURCE: 1995 META GROUP SURVEY OF ITS DATA WAREHOUSE CONFERENCE ATTENDEES. 175 RESPONSES

CHART BY CHRISTINA WILLIAMS

Although trendy, the idea of storing information for later access is not new (just think, for example, of that primitive warehouse, the file cabinet). But until recently, batch-oriented operational systems constrained the potential for online data diving. Many business users looking for data had to request reports from IS. This often took several days, with the data extractable only in a predefined format not easily altered to accommodate different what-if scenarios. Moreover, such queries run the risk of straining an online transaction processing (OLTP) system's computational power.

"Process transactions, in many production systems, tend to be short, simple updates—a new bill, for example," says Aaron Zornes, service director and senior vice president of application development strategies at Meta Group Inc. "Analytical processing, on the other hand, generates some very complex queries, as people ask a variety of what-if scenarios. It can screw up the production system."

With challenges like these, it's no wonder the prospect of quarrying information more easily out of a warehouse has many would-be data miners yelling, "Eureka!" Ninety percent of respondents to a survey conducted at the Meta Group/DCI Data Warehouse Conference in February 1995 either had a data warehouse in use or expected to have one online within the next six months. The Stamford, Conn., research group predicts that the warehouse market will reach $2 billion this year.

The thing is, while putting together a warehouse environment that provides easily extractable, consistent and fresh data may be an obvious goal, it's not an easy one to achieve. The main problem, says McElreath, is that companies fail to differentiate between infrastructure and architecture. In a white paper entitled, "Data Warehousing: An Architectural Perspective," he explains the difference: "The architecture defines the functions and responsibilities for each component of the application; the infrastructure specifies the hardware and software used to implement each component.... In our opinion, data warehouse architecture issues are more important than the specific tools that will implement the architecture."

Jane Griffin, president and CEO of consultancy Systems Techniques Inc. in Atlanta, agrees, telling of a large West Coast insurance company whose IS staff decided to build a data warehouse. The group picked out a database, data extraction tools and user query tools and built a prototype warehouse. It was only at that point in the process, she says, that they gave any thought to what should be going *into* the warehouse. "How do you know if you have the right front-end tools if you don't know what you're accessing yet?" she asks.

Granted, some development requirements will be dictated by purely technical considerations. Canadian Tire, for example (see Page 43), developed its warehouse in DB2/MVS, a mainframe database better suited for transactional processing, because its IS staff could shorten development time by working with a technology with which it had some experience. And, Finkelstein points out, "with any kind of design, there are always trade-offs. You need a solution that intersects with different perspectives and requirements."

The final goal, says McElreath, is to create a warehouse that is "sufficiently flexible to accommodate the changing functional and technical requirements of populating, administering and analyzing the warehouse information." As the experiences of these three profiled companies show, a data warehouse is an ever-evolving application. These organizations—a tire retailer whose system is several years old, a plumbing fixture manufacturer in the midst of warehouse construction and a health-care provider in the early stages of planning a warehouse—are trying to craft warehouses that fit user needs while adhering to technical and development requirements. The important thing to remember about a warehouse, says Zornes, is that "it's a process, not a place."

Canadian Tire Corp. Ltd.

Toronto, Canada

AT ONLY TWO AND A HALF YEARS old, Canadian Tire's warehouse should be more toddler than teenager, but the application has grown so fast that the IS group has to run to keep up. "We've learned that there is no one perfect solution that will meet everyone's requirements and last forever," says Systems Architect David G. King.

The warehouse project is part of CTC's $3.7 billion retail division (which makes automotive, sports and leisure, and home products). It started in late 1992 in order to stem the proliferation of independent databases containing inconsistent information ("a death knell if you're using the information to make business decisions," says King). Constructed in smaller increments rather than as an enterprisewide entity, it contains information on inventory, distribution requirements (dealer orders, for instance), supply chain management and logistics, and retail sales. "At this point, it's about 200 gigabytes and growing. There are still pieces we're working on," says King.

As more users access the ever-expanding amount of warehouse data, King's group has found that what they predicted at the architectural design stage has not always panned out. For example, the group divided data into two levels of detail: what King calls the atomic layer, or data at its most detailed; and a summary layer derived, or "rolled up," from the atomic layer.

> *"The business-area folks gave us a cost-benefit analysis that showed the worth of the atomic data in the millions, and more DASD cost $150,000. It was a no-brainer."* *–David King*

Initially, only summarized data was available online; atomic data was archived on tape backup. "The expectation was that most of the analysis would happen at the aggregate level," he says. However, as more people got direct access to the warehouse, "we discovered that they were very interested in going after more-detailed information." So King's group exponentially expanded the warehouse by adding several years' worth of atomic-level data. It required a higher-level direct access storage device (DASD), but the investment was worth it, King says. "The business-area folks gave us a cost-benefit analysis that showed the worth of the atomic data in the millions, and more DASD cost $150,000. It was a no-brainer."

King recommends that prospective warehouse builders spend plenty of time tracing the path of information through the data headwaters, the production systems. "We're relying on data from operational systems that were built 10, 15 years ago," he says. "They've been patched, added to and maintained, and over that time, some redundancy and inconsistency have crept in. A warehouse is only as good as the data that gets fed to it."

The project team is also adding a middleware layer between the users and the warehouse to compensate for another byproduct of the warehouse's popularity: It was sustaining so many user queries that its computational resources were being strained. This layer, says King, will optimize incoming requests, taking some of the strain off the database engine.

King can't predict how Canadian Tire's database will look two years from now, but he does advise others to start with a flexible design that can adapt easily to growth. "As business-people start to make use of the warehouse, they'll think of new ways to use it," he says. "It's a matter of keeping up with change."

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Moen Inc.

North Olmsted, Ohio

TECHNICALLY SPEAKING, MOEN already had a data warehouse—on the mainframe. But end-user access to the information was so constrained that "it was more like a data jailhouse," says Mark Zozulia, the manager of information resource management at Moen, a manufacturer of faucets and plumbing supplies.

Anybody who wanted information had to request it from either an IS staffer or a power user skilled in the warehouse's report-writing tool and then wait several days for the resultant paper-based report. Then, he says, "if you had a further question, you had to go back and get a new report." So in December 1994, the company decided to build a client/server warehouse that all users could access without risking severe migraine onset.

Zozulia put together a project team of IS folks, prospective users and senior managers to brainstorm requirements. First of all, the group decided to divide the data into smaller segments, commonly known as "datamarts," that would eventually share a common repository and be built to common data definitions. "We wanted to do an incremental quick hit,"

MARK ZOZULIA: *Moen's old mainframe-based data warehouse "was more like a data jailhouse."*

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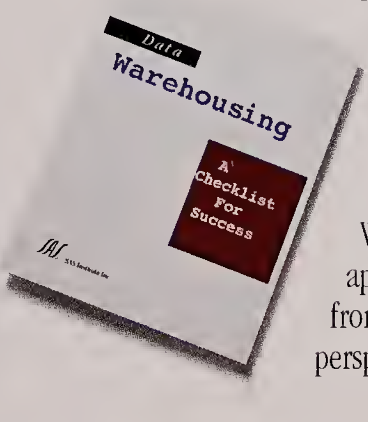

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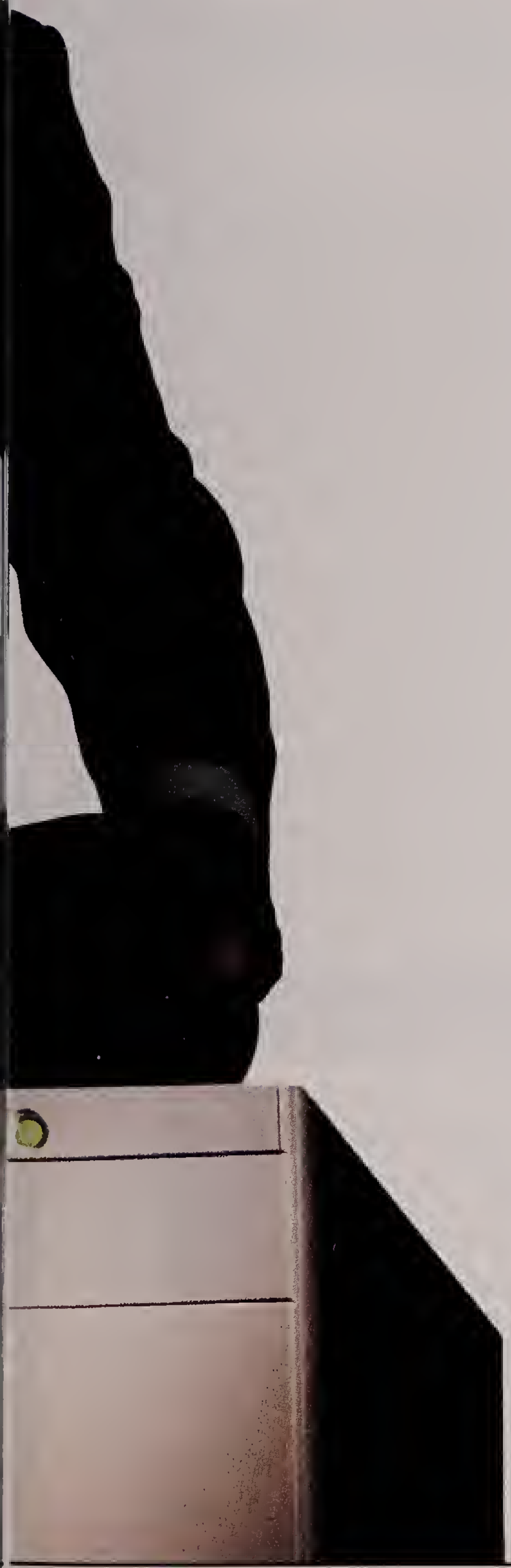

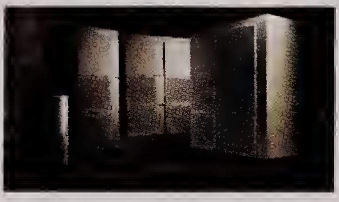

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says Zozulia. "We didn't want to take more than six months for any phase or people would lose interest." They chose sales history as the first datamart for a couple of reasons, says Zozulia. First, the sales department was a big user of the earlier warehouse application. And the team felt that this type of sales information was easily understood from a data definition point of view. (For example, figuring out ways to view invoices for the past two years is pretty clear-cut, says Zozulia.) Moen had already defined much of the data for the mainframe-based warehouse, giving it a strong starting point, but the team still wanted to begin with a fairly simple project.

Once the data was identified, the group set about feeding it into the warehouse. The information services group had already written Cobol programs to pull information from the production systems onto the mainframe warehouse, so they passed those files to Unix and into the new Oracle-based warehouse. They also added a "data scrubbing" process, which validates incoming data against predefined standards. This way, says Zozulia, IS can pinpoint the source of inconsistent data and fix it before it goes into the warehouse. More important, when the warehouse is complete, it will provide a common source of consistent data for the entire company.

The project team rolled out the first module, nearly 10GB of data, to about 50 users (mostly from sales and marketing) in June 1995, within the six-month development cycle. The next step is to add more-complicated data about profit margin analysis. Although that project is still in the planning stages, the company wants to add more operational data to factor in real costs on every product. This will help Moen better manage the bottom line for various products and customers.

BILL DOTSON: *Promina identified 675 business items people wanted information about as well as 245 different data sources.*

PHOTO BY LOU JONES

Promina Health System

Atlanta

PROMINA HASN'T BEGUN CONstruction of its warehouse yet, but by the time it's finished two years from now, the application will be huge. The nine-hospital health-care network, which also has ties to private physician practices, is planning an enterprisewide information warehouse that will eventually pluck information from more than 245 data sources and involve every business practice at each hospital, from managed care to patient diagnosis. In order for this to work, however, the company had to fashion a coherent warehouse development strategy from the nine hospitals' disparate systems, business functions, processes and user needs.

Bill Dotson, Promina's CIO and vice president of information services, says that it's a massive undertaking, but the company had to have a detailed blueprint of information sources and how such information flows through the health-care network before his group could even think about starting warehouse construction. "We also knew we couldn't do it alone," says Dotson. So he enlisted the help of Systems Techniques Inc., an Atlanta-based consultancy.

STI convened a three-day requirements definition session, involving more than 50 Promina employees in a wide range of jobs, including database specialists, nurses and claims processors. STI will use the session results to build both a physical data model and a technical architecture.

Basically, says STI President and CEO Jane Griffin, Promina employees needed to identify the informational sources they use to

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Building Codes

Companies that want to build a successful warehouse (one that users will use and that has clean data) would do well to reach consensus on the following issues before they start construction

Data integrity: When a data warehouse gets informational feeds from many different operational sources, data coming in often needs to be reconciled for consistency. For example, the customer codes in one database are probably completely different from the codes in another. IS and business unit employees need to agree on common data definitions to make sure that each business unit is speaking the same language. Aaron Zornes, senior vice president of application development strategies at Meta Group Inc., calls it data hygiene—"you need to clean it every day," he says.

Data sources: Before anything else is done, companies should convene an informational summit talk comprising users, IS and senior management to figure out which sources business users draw upon for what information. This will help identify primary as well as redundant sources of information, which will define the most important sources for the warehouse.

Metadata: The warehouse should contain a separate repository for "metadata," or data relating to the creation and maintenance of the warehouse. This information governs how warehouse information is structured and maps the queries of a user to the operational data source.

Level of detail: Different groups will want and need different levels of data detail. While sales groups frequently like their data in aggregate form (sales by month or quarter, for example), other groups prefer to drill down to a deeper level of detail for analysis. A retail company, for example, may want to access the data all the way down to individual transactions. Many times, a warehouse will provide different levels of detail to different groups, but this needs to be decided ahead of time so that the metadata can be so structured.

Refresh rates: Again, this will vary according to user needs. Some will need real-time data feeds, while others can use data that is refreshed daily or weekly. A 1993 International Data Corp. survey of 200 IS professionals found that about 36 percent of respondents' companies refreshed their data warehouse information each day. *–C. Hildebrand*

do their jobs, as well as the processes within the company where information needs are most critical. The group started by brainstorming business processes and putting them into seven business functions: quality and risk management, finance and planning, marketing, provider/network management, managed care/contracting with providers, patient care delivery and provider management. A business process of provider management, for example, is physician credentialing.

The participants were then divided into small groups to break down the processes into subprocesses; the credentialing function, for instance, was divided into 14 subprocesses, such as state and DEA license verification, and board certification. From this, the groups drew data-flow diagrams that identified these smaller processes, as well as current or future information sources for each subprocess, the business information that comes from each source and the attributes of this business information. STI will use these diagrams to define the actual fields that will appear in different data views of the warehouse.

A facilitator helped each breakout group, but the work was still tedious and difficult. For example, the group working with patient care delivery became very frustrated with capturing data requirements. "They were having problems working down to the level of detail that we need," says Brian Paige, one of the facilitators.

All told, the three-day session yielded about 675 business items about which people want information, and 245 different data sources. Working with these elements, STI will concurrently develop a technical architecture and a data map that traces each data element from where it is today to where it will reside in the warehouse. STI's Griffin estimates that both projects will take four to six months, after which Dotson's group will start to implement the actual warehouse. Dotson isn't sure just how big the finished project will be, but he wouldn't be surprised if it eventually contained terabytes of data. "It's a monumental task," he says. "It's both tremendously exciting and a tremendous headache."

At least he'll know exactly where to go for aspirin. CIO

Carol Hildebrand can be reached at cjh@cio.com.

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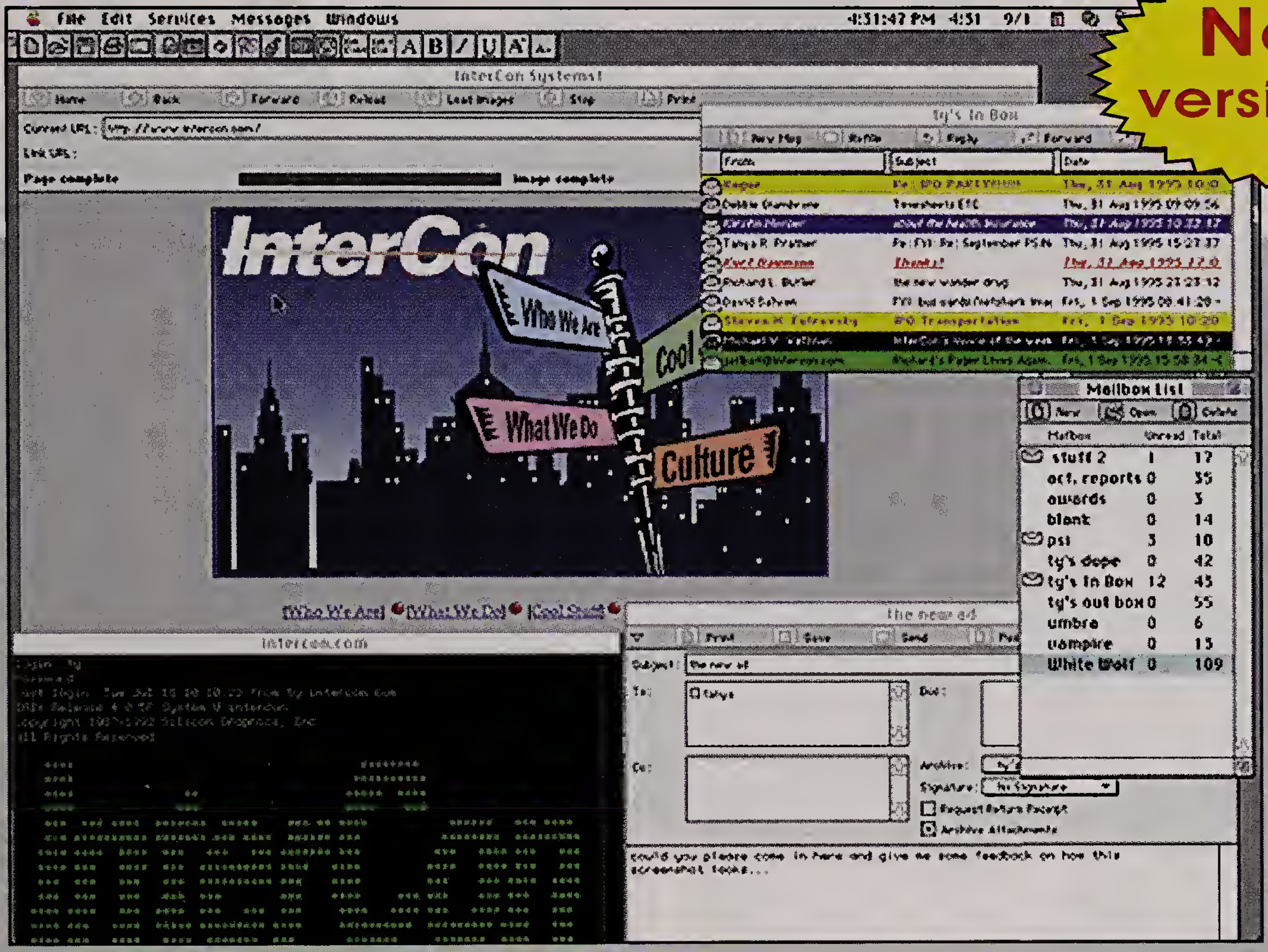

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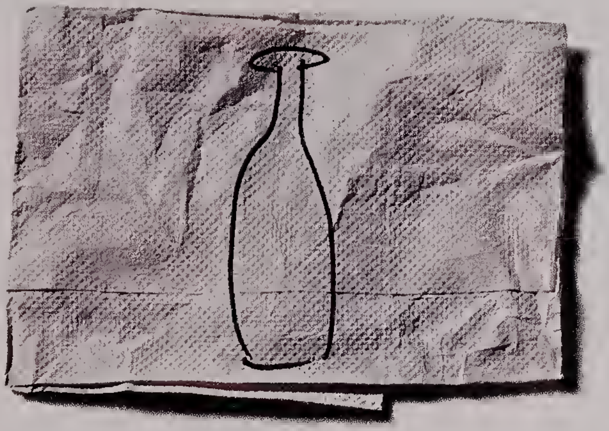

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Hired Guns

BY PETER FABRIS

MAC MORGANFIELD'S BLOOD PRESSURE climbed as he picked up the morning's edition of *The Gazette*. The lead business story was a profile of National Gadgets Corp., an arch rival of Acme Widgets Inc., and how it had achieved wondrous improvements in market analysis and customer service from a slick new technology. As the CEO of Acme, Morganfield was fuming because his IS department had just spent millions on a new system that was unlikely to improve operations enough to keep pace with National's latest challenge.

Unable to speak the language of bits and bytes, however, Morganfield wasn't sure exactly what was lacking, only that his CIO, Bob Johnson, had failed to deliver the technology solution that Acme urgently needed to compete with National. Johnson had been a loyal worker and knew the technology side inside and out, but he hadn't grasped the business pressures Acme was facing. Morganfield saw only one option: Fire the CIO.

Unfortunately, Morganfield didn't feel he could fall back on any of Johnson's underlings to step in and improve matters. Johnson had molded the department in his own image by recruiting a number of top-notch technicians who, like himself, lacked the big-picture business sense to align Acme's IT with its strategic goals. Morganfield decided it was time to recruit a CIO from outside the company to encourage the needed change of direction in IS. But he had no idea a replacement would be so difficult to find. After six months, the executive search firm's labors turned up empty. Meanwhile, Morganfield had hired a consulting firm to help devise a plan to meet National's challenge.

Chet Burnett, head of Ace Consultants' project team, was brought in to begin the first phase of an IT overhaul that would leapfrog National's systems and give Acme a competitive edge over its bitter rival by integrating manufacturing, marketing, supply chain management and customer service systems. Morganfield had been so impressed with Burnett that he beseeched him to stay on in a permanent role. But Burnett wasn't interested in a full-time gig. He agreed,

ILLUSTRATION BY JOE FLEMING

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think!

instead, to remain for another year as interim CIO and to work closely with Morganfield to find a permanent IS executive.

With the CIO's role shifting in many organizations from technological guru to business strategist, and with technological change outpacing the manager's ability to adapt, it's no wonder this scenario is repeating itself in companies across America today. "Managers don't quite understand where they're going with technology," says Stanley J. Goldman, president and CEO of Technology and Business Integrators Inc., a Woodcliff Lake, N.J., consultancy specializing in IT outsourcing. When the executive board isn't sure what it wants from the company's technology, it can hardly be expected to articulate an IT strategy. Often, it turns to a consulting firm to help develop that strategy and hire an IT sage.

But CIOs with proven track records, particularly those with the strong business sense to link technology to strategic objectives, are rare commodities indeed. The idea of hiring temporary high-level IS executives may not be a new idea, but anecdotal evidence suggests that CIO hired guns are more in demand than ever. The reasons for signing on a temporary IS chief are unique to each

Texas Ranger

A former CIO is itching to get back in the saddle again

A former prominent IS executive, Charlie Feld, former CIO with Frito-Lay Inc. in Plano, Texas, established a "CIO-for-hire" firm, The Feld Group, in 1992 to specialize in interim CIO assignments. Feld is a CIO-for-hire with Burlington Northern Inc. in Fort Worth, Texas, and his partner, Monte Jones, former CIO of Kentucky Fried Chicken Corp., is serving a CIO stint with Westinghouse Electric Corp. in Pittsburgh. The Feld Group employs 10 people, including several technology specialists and a few mid-level IS managers being groomed for CIO positions.

Under Feld's direction in the 1980s, Frito-Lay's IS department developed award-winning logistics and executive support systems. By the end of the decade, Frito-Lay's accomplishments were widely chronicled (see *CIO*, June 1988, Page 38) and a number of CEOs recruited Feld. By that time, Feld was less involved in day-to-day operations as Frito-Lay's major technology initiatives were largely completed. Meanwhile, Feld spent much of his time on the lecture circuit touting Frito-Lay's IT accomplishments, but he was itching for a chance to test his system development methods and managerial ideas at another organization. He missed the challenge of redesigning and implementing mission-critical systems. "It's fun to go in when things are chaotic, to have sweat rolling down your back," Feld says. "It gives you a chance to make new friends and test yourself again."

Burlington Northern's Chairman Jerry Grinstein needed someone who could modernize IT and link various departments and workgroups together electronically, particularly operations and marketing. "It takes an unusual mind to comprehend all that," says Grinstein. Based on Feld's reputation and a few personal meetings, Grinstein was convinced that Feld (whom he calls "a non-resident permanent CIO" rather than a temporary CIO) had the intellect and experience to get the job done. So, he agreed to accommodate Feld's wish for a temporary arrangement.

Feld says he and Jones perform their roles just as if they were permanent executives. "It looks, feels and smells like a real CIO job," Feld says. The difference is that they are paid on a contract basis, not as salaried employees, and there is an explicit understanding that the two are with the companies for a limited time. Feld's contract doesn't specify the number of years he will be with Burlington Northern, however. The arrangement will probably end when he and Burlington Northern's governing board are convinced that the company can function smoothly without him. "I'll know when my team doesn't need me," Feld says. "The shorter company, but most often the executive board is looking for a sweeping change in its IT strategy to achieve business goals. When, after an exhaustive search, no visionary emerges to align technology with the process changes necessary for improved competitiveness, companies may turn to a consultant to fill in as CIO, giving that person all the powers and authority of a permanent CIO until a successor signs on, unlike a more advisory role of a typical consulting assignment. Or they may persuade a highly regarded old-timer out of retirement. The interim CIO's stint can range from a few months to a few years, and although the board may prefer someone who would serve a longer term, it might decide that the temporary solution is its best option to rejuvenate IS. Ideally, an interim CIO will leave a legacy of technological excellence, a cohesive alignment of IT with business goals and a competent, industry-savvy successor when he or she moves on to the next assignment.

EDS Management Consulting Services offers "what we jokingly call our 'Rent-a-CIO' service," says Douglas Trotter, managing principal of the company's strategic technology consulting group based in Plano, Texas. His group's Office of the CIO primarily offers assistance to CIOs; however, it also furnish-

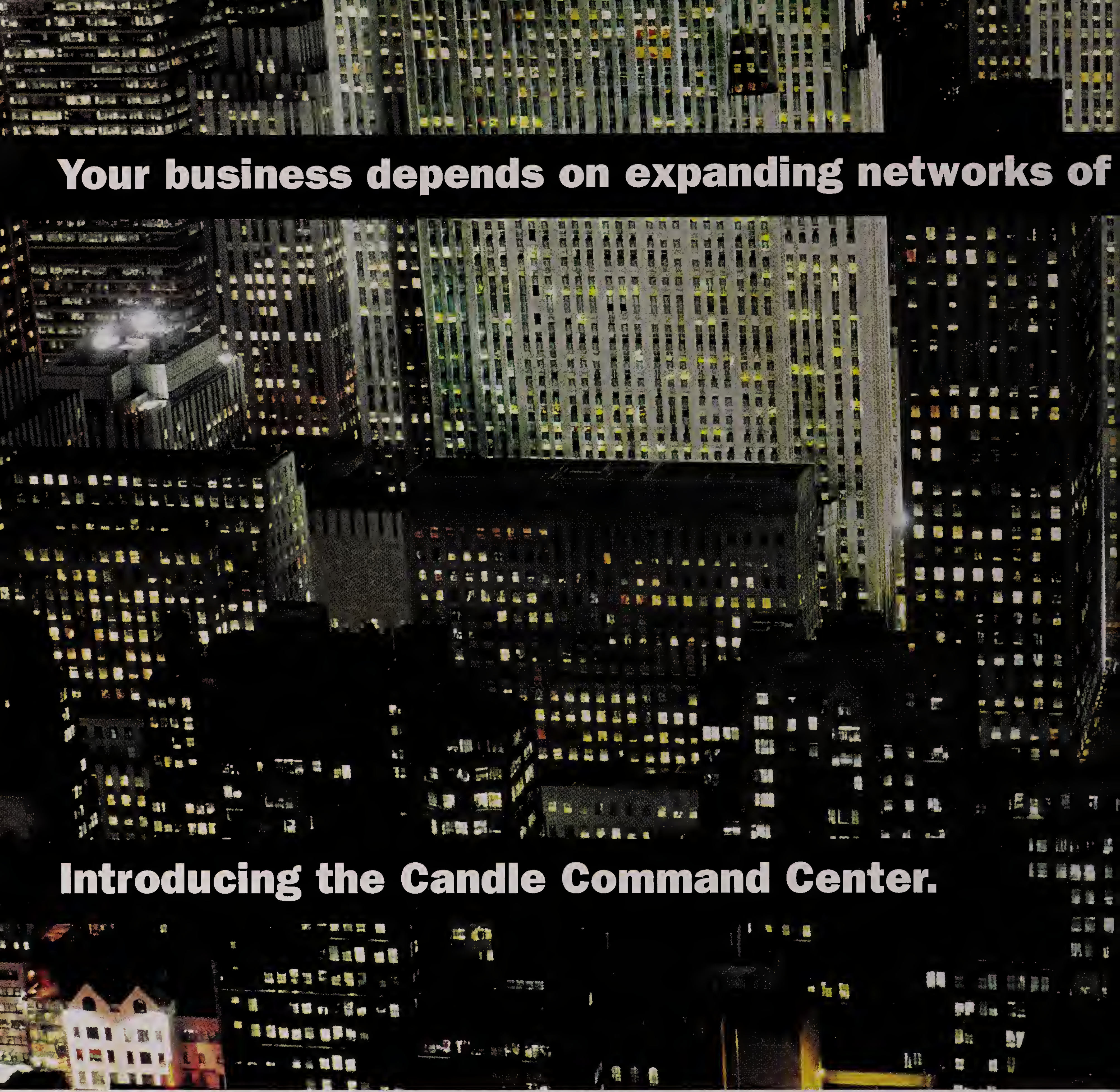
CHARLIE FELD *had to make tough calls "right off the bat."*

the period of time I'm here, the greater the success." He expects his Burlington Northern tenure, which started in early 1993, to last three to four years. With the September 1995 merger between the company and Santa Fe Pacific Corp., however, that estimate could change.

His long-term goal is to establish a post-graduate CIO school that would advance the profession by having CIOs share a common body of knowledge as do professionals in law, medicine and other pursuits. "There's tremendous technology and technical talent [in the profession]," he says. "What's lacking is the crystallization and orchestration of all those pieces." He envisions a constant presence of Feld Group teams in the corporate world that would feed their experiences back to the school so that it could keep current with technology and management trends and pass on that knowledge to IS executives.

While bullish on the future of the profession, Feld believes IS must become faster at implementing technology. As business cycles shortened to one to two years, IS hasn't kept up, he says. In the past, the traditional five- to seven-year IT cycle was fast enough to keep pace with business needs. That's no longer true. New technology such as object-oriented programming can help IS speed up its work, but people management—training, motivation and the like—hasn't advanced enough to gain maximum leverage from new technology, Feld says. A great believer in the ability of IT to enhance corporations, he says the CIO profession "will really come into its own over the next 25 years." Developing a common body of knowledge and sharing expertise will assist CIOs to improve their status within their organizations, he says. "I love being a CIO. You can look back at what you've done and say I was a part of building that. It's concrete stuff like a building or a city." *–P. Fabris*

PHOTO BY DAN BRYANT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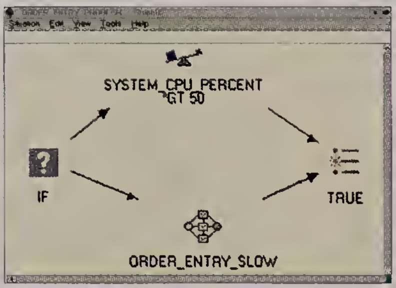

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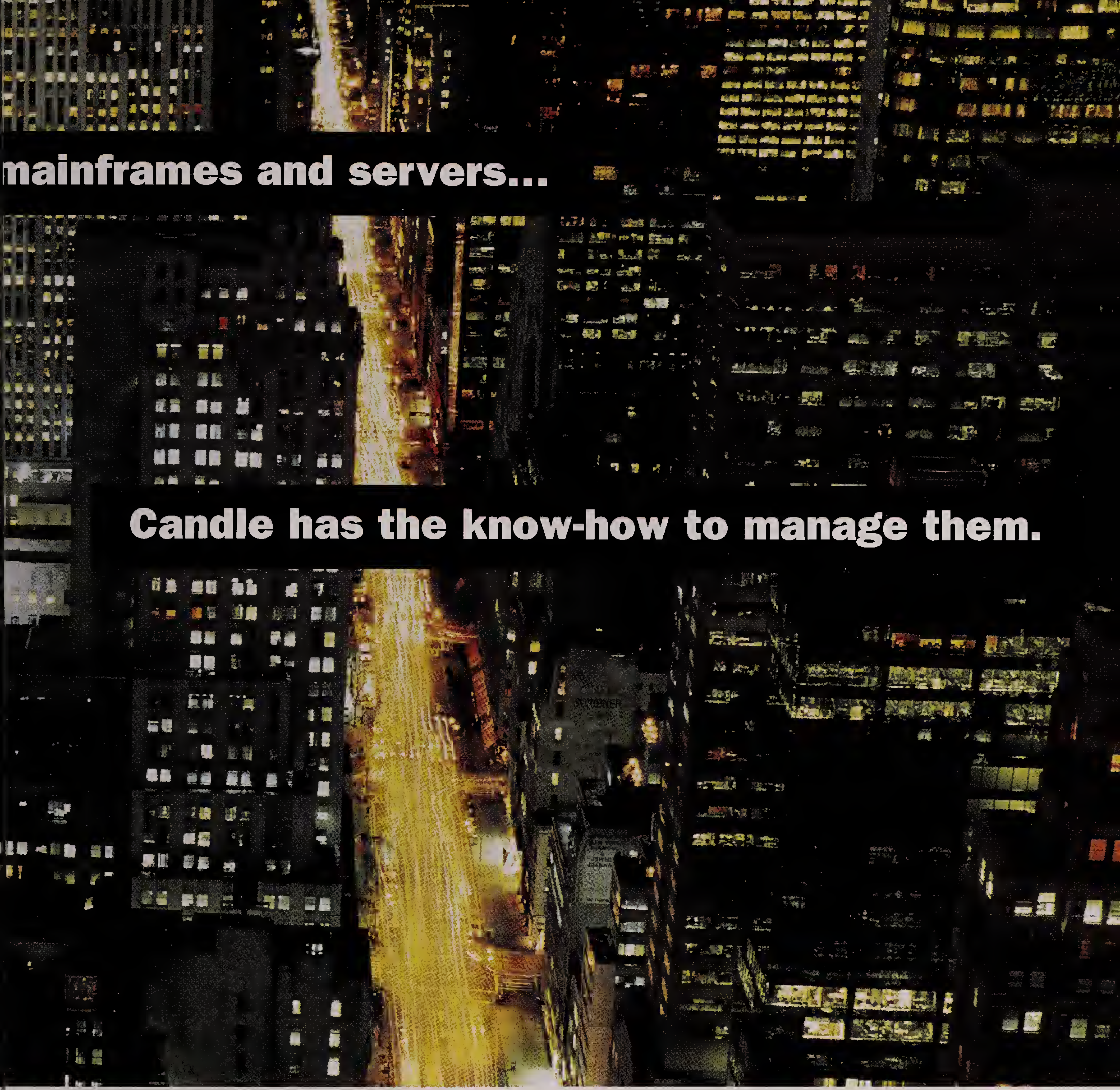
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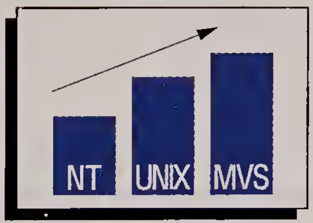

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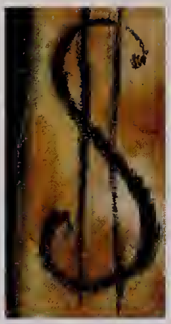

es temporary CIOs for some companies. Since its launch about a year ago, the group has provided an interim CIO for one client after a senior IS executive died and for another after a leveraged buyout required technology guidance while management focused on other issues. In the latter case, "they didn't have time to seek a permanent in-house person [right away], and the executive group didn't feel comfortable making the IT decisions," says Stephen Reiter, principal in charge of EDS's Office of the CIO Group.

Andersen Consulting typically has 10 to 20 acting CIOs in the field, with another 20 to 30 "functioning that way without the title," says C. Rudy Puryear, managing partner of Andersen Consulting's IT strategy practice in Chicago. When Andersen's consultants step into a CIO role for a limited time, it's often to manage a mainframe-to-client/server conversion. Temporary IS management outsourcing assignments are definitely on the upswing, Puryear says.

A cynic might argue that all top IS positions might as well be considered temporary because of the high turnover rate in the profession. In fact, some observers believe CIOs who agree to temporary stints upfront may be more common than is generally believed. "We know of some, but they won't tell you that [they're temporary]," says Michael Blum, partner with Coopers & Lybrand LLP's Technology Advisory Services group in New York. That situation is most common with CIOs nearing retirement and looking for one last challenge to cap off their careers. Although a CIO's stint in this instance isn't explicitly limited, there may be a tacit understanding with the board that the CIO will depart after a few years.

Ideally, an interim CIO will leave a legacy of technological excellence, a cohesive alignment of IT with business goals and a competent, industry-savvy successor.

Some attribute the lack of job security in the CIO's post to the widespread reengineering phenomenon that is producing jolting organizational changes often enabled by IT. Demands on IS departments have never been greater. CEOs expect CIOs to routinely devise and deliver key operational and strategic systems. At times, CIOs are their own worst enemies by "overpromising what they can deliver," says EDS's Reiter. Sometimes poor personal chemistry between the CEO and CIO results in a communication breakdown, yielding insufficient funding for IT projects and years of neglect to the technology infrastructure. Even if top management hamstrings the CIO in that way, they often hold the CIO accountable for the company's technology. If they are dissatisfied with the return on IT investments, the IS chief may be ushered out the door.

A number of observers point to the evolving role of the CIO from a technician and operations specialist to a business strategist as a major reason for an increasing number of interim IS chiefs. "There's the age-old dilemma of whether to hire a business person or a technical person with some business [expertise]," says Puryear. The right mix of technical acumen and business sense is open to debate and will probably vary from organization to organization. Many companies haven't resolved that debate, he adds, creating a level of uncertainty that makes it difficult to choose a permanent IS honcho.

One likely driver of this trend is the massive change happening within many industries. Indeed, companies in a state of flux sometimes opt for a temporary CIO during an organizationwide restructuring, where the hired gun is perceived as a restructuring specialist, Blum says. Because IT is such an integral part of this transformation, CIOs must provide more strategic input than ever.

In banking and financial services, for example, industry change is having a direct impact on the role of the CIO. Banking customers want access to once-proprietary information and services such as currency conversions. With IT, customers can convert currencies themselves more cheaply and efficiently than banks can on their behalf. Bank CIOs used to be most concerned with supporting internal transactions, says Francis Petrash, principal with EDS Management Consulting Services based in New York. Now serving as a temporary CIO for a New York financial services firm, Petrash says the new business climate demands that bank CIOs identify the services customers want and then figure out how to deliver them. "That skill set is not a transactional one," he says. Sometimes a CIO steeped in transactional operations can make the transition, but many cannot. Petrash sees a generational trend whereby financial services firms replace aging CIOs steeped in technical (particularly mainframe) expertise with executives in their mid-30s who are more informed about business trends than technical matters.

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Petrash has had several interim CIO stints in recent years. "At first I thought it was a fluke," Petrash says. Now, he sees interim CIOs becoming more common in financial services as companies employ them for assistance through this period of major transition.

Suffering no lack of self-interest in promoting their services, consultants can make compelling arguments for limited use of interim CIOs. Perhaps an outsider's most important advantage, particularly if he has multiple assignments under his belt, is valuable experience managing change. The newcomer offers a fresh look at a company's business and technical challenges, approaches solutions objectively and isn't bound to old processes simply because they've always been done a certain way.

Burlington Northern Inc. hired Charlie Feld from the Feld Group Inc., in Irving, Texas, as the company's interim CIO who, in turn, brought in some highly skilled employees from his own consulting firm. These employees had worked for large corporations in the past and "didn't necessarily want to work for another one," says Jerry Grinstein, chairman of the recently merged Burlington Northern Santa Fe Corp., headquartered in Fort Worth, Texas. So Burlington Northern likely couldn't have recruited these employees on its own. But Feld was able to persuade them to come work with him.

D**espite those advantages,** most consultants aren't eager to promote the CIO-for-hire concept, nor do they argue that hiring a temporary CIO is the most desirable option. A permanent hire offering long-term stability is a better alternative, but it can take six to 18 months to conduct an IS executive search, Puryear says. Many companies can't afford to leave the CIO post open for that long. Even Feld (who was a former CIO with Frito-Lay), whose firm specializes in interim CIO work (see related story, Page 58), acknowledges that hiring a permanent IS chief is preferable. "But, when [a CEO has] tried to do that a few times and it doesn't work, he gets gun-shy," Feld says. In such a situation, hiring a contract CIO with first-rate credentials is an attractive alternative.

There are potential pitfalls, however. Anytime an outsider takes over a key management position, the staff gets anxious. As most consultants know all too well, coming into an organization as an outsider often means walking into a politically charged minefield. In order to avoid disaster, a CIO hired gun must have the unwavering support of the CEO and the board of directors. Without a clear understanding throughout the organization that a contract CIO has as much real authority as a permanent one, the hired gun is likely to misfire.

"The first six to nine months [of a temporary assignment] are very tough," says Feld. Upper management demands results faster when they hire a contract CIO than when they hire a permanent one, he says. A contract CIO doesn't have the luxury of easing into a new position. "You've got to make some tough calls right off the bat," says Feld. "After that, people begin to rally." Staff members are anxious about their own performance, but with the popularity of outsourcing, they may fear that the temporary IS honcho will slash entire functions from the organization and they could lose their jobs regardless of how well they perform.

Although outsourcing certain processes makes sense for some companies, Feld says, he is not an advocate of full-scale outsourcing. "If you build a bionic organization, there's no accountability. Nobody inside the organization has ownership [of the technology]." He believes strongly in building a top-notch IS organization from within and, if successful, that should create long-term stability for staff members as IS proves its indispensability to the company.

Often, an interim CIO's final major task is finding his or her successor. On two recent assignments, Petrash served on a committee with company executives to define the skill set and characteristics required of a permanent CIO. An interim CIO sometimes meets with candidates during the hiring process and has great influence in choosing a successor. Ideally, says Feld, an internal candidate emerges whom the interim CIO can groom for the permanent assignment.

Companies will likely see CIO hired guns as viable alternatives as long as there are CIOs, but the late '90s may be remembered as the heyday of this phenomenon. Most observers expect companies to redefine the role of the CIO in this time. Once they figure out what they want from their IT chief, they'll find it easier to define the CIO role and the ideal candidate's background and expertise. Presumably, once this becomes clear, more employees will seek out the necessary training and education that will extend the average CIO career expectancy. CIO

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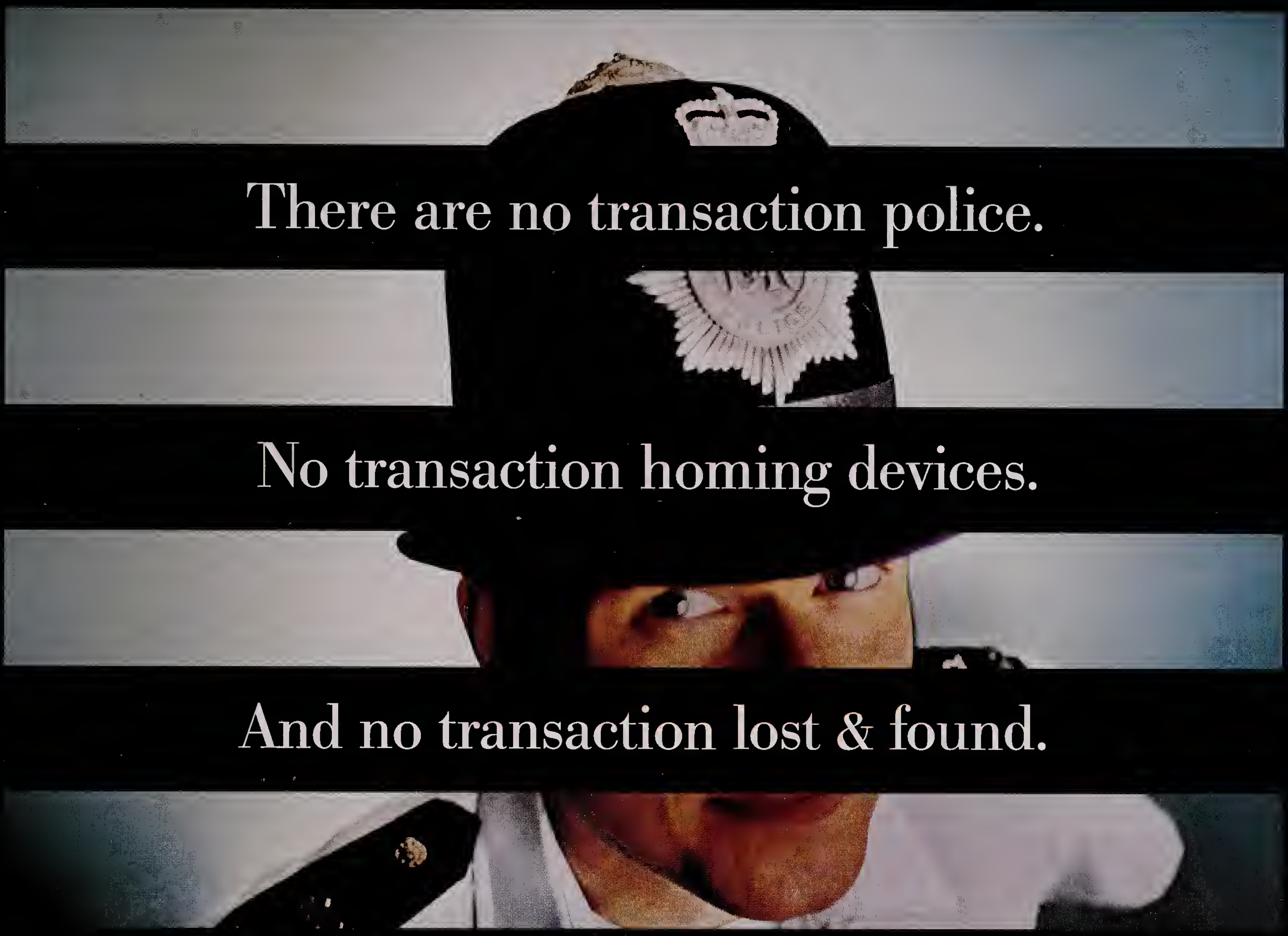
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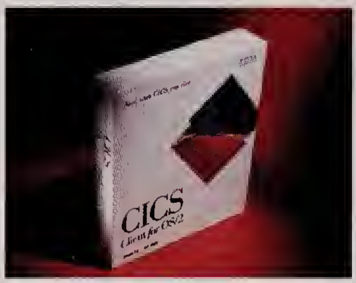

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EXCHANGE *of ideas*

BY CHRISTOPHER KOCH

There are two words that describe the soul of the Chicago Mercantile Exchange: "open outcry." This is the institutionalized, efficient boorishness—the yelling, jostling and frenzied gesticulation—that traders in "the pits" use to communicate and consummate speculative sales of everything from those infamous pork bellies (the raw product for bacon) to sophisticated currency instruments.

Mike Kelly, senior vice president and CIO at the Merc, faces a politician's dilemma over open outcry. He is charged with making technology an ever-more-integral part of the way the Merc does business, but he faces an organization of men and women in the pit who are skeptical that silicon is any match for caffeine and adrenaline.

That computer technology is new and open outcry is old (ancient in fact; it has its roots in Persian bazaars) is of no consequence in Kelly's thinking.

STORYLINE

Since 1987, the Society for Information Management (SIM) has bestowed its Partners in Leadership Award upon IS and business executives who have demonstrated exemplary collaboration in achieving extraordinary business benefits from the use of IT. The winners of SIM's ninth annual award have helped the Chicago Mercantile Exchange execute an enormous volume of transactions with ever-greater speed, accuracy and efficiency. Beyond that, the Merc's ongoing IT projects aim to win it larger shares of financial-trading business and to provide customers with stronger real-time decision support. The honorees are Mike Kelly, senior vice president and CIO; Don Serpico, executive vice president of operations; and Kathryn Meyer, senior vice president of the Merc's Clearing House.

DON SERPICO *(l.-r.)* **MIKE KELLY** *and* **KATHRYN MEYER:** *creating a system to ride a tidal wave of trading.*

PHOTOS BY MARC BERLOW

He feels no urge to simply replace the old way of doing things with technology. Yet it's clear that in some instances, open outcry may no longer be the best way to attract and keep business at the Merc.

That threat is most keenly felt in the area of currency trading. Indeed, pork bellies only go so far these days; 97 percent of the Merc's volume is now in various forms of financial futures and options. Some of those products have thrived in the pit — such as currency futures, which represent a way to hedge and speculate on the future price of yen or marks, for example.

Yet the Merc's success with currency futures represents only a fraction of the overall currency market. Most currency is traded very quietly in vast lots by the major international banks that have computer links to one another through the so-called interbank market.

Banks generally won't bring their big volume deals to the Merc because the rough and tumble trading paradigm of the pit doesn't meet their needs. They want predictability and anonymity—a certain size lot at a certain price with no fanfare—and the pit is built around frenzied, real-time bidding. The Merc tried for years to rewrite the rules to accommodate large-lot trading in the organized chaos of the pit, but to no avail, according to Kelly.

In 1994, however, Kelly's IS department offered a radical alternative. The new approach called for a client/server network of pen-based notebook computers to be installed in the booths, maintained by the member trading firms, that encircle the pit. The booths are a way for customers to call orders in to the member firms, who have them executed by a pit broker. But rather than flash the large orders down to the unpredictable pit, the new system gives the members the option of sending out an anonymous computer query to other large dealers asking for a bid or offer on a single large currency lot. The other firms respond in real time, and the lot goes to the best price. The system mimics the safety of the interbank market—no haggling, no names. It's also fast, predictable and cheap, because customers don't incur the broker fees of the pit, says Kelly. As more currency circles the pit, however, Kelly predicts some of those deals—or pieces of the big deals—will spill over the edge and create new business.

> **"It just shows that when you're losing market share, good ideas get another chance."**
>
> *–Mike Kelly*

Ironically, the biggest challenge for Kelly and his IS department was not the technology itself but rather "for IS to spawn the system without getting crucified," jokes Kelly. His system was rejected once by a Merc committee, but thanks to some shrewd lobbying, it never quite went away. Kelly and Don Serpico, executive vice president of operations, forged an alliance among IS, the Merc's marketing department, two member firms and an influential pit currency trader to push the initiative forward, finally getting approval to roll out a trial in late 1995. "It just shows that when you're losing market share, good ideas get another chance," says Kelly.

Such executive partnerships are crucial at the Merc, where IS accounts for 25 percent of the overall $145 million operating budget. Many of the partnership initiatives that won the Merc SIM's ninth annual Partners in Leadership Award are focused on the trading process, adding speed, accuracy and efficiency to the extraordinary volume that courses through the exchange each day (226 million contracts worth nearly $200 trillion in 1994, 100 times more than the New York Stock Exchange).

THE MERC: *rewriting the rules of the trade*

PHOTO COURTESY OF CHICAGO MERCANTILE EXCHANGE

Business and IS have worked together to create a mammoth two-part client/server network to handle the daily tidal wave of trading. One system acts as the primary conduit, and the second system is there to back up the first. But so far, despite a peak trading day of 2.4 million contracts in February 1994, the backup system has never been called to active duty.

Beyond technology support, however, SIM also recognized that IS is working with the business side to redefine the way the Merc does business, to provide the flexibility necessary for the exchange to continue to grow. This is the goal behind Clearing 21, an ambitious three-year effort to reengineer the way the Merc's back-room operation, the Clearing House, keeps track of members' trading positions on everything from pork bellies to currencies during the day, and settles things up when the shouting stops.

Not that the legacy system is bad: When the NYSE proudly announced recently that trades would be settled in three days instead of the usual five, Merc leaders smirked—twice a day is the rule in Chicago, and it would no doubt be more frequent if the costs weren't prohibitive, according to Kelly. Instead, the focus of the new system will be on giving members a near-real-time sense of where they stand at any given moment during the day—allowing them to balance their

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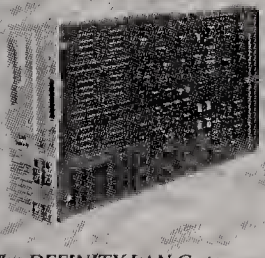

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"**In the past, we've needed a year or 18 months to get ready for a major innovation. Now we think we'll be able to do it in three or four."**

–Kathryn Meyer

LIFE IN THE PITS *is becoming less chaotic, thanks to IT.*

PHOTO COURTESY OF CHICAGO MERCANTILE EXCHANGE

accounts to razor sharpness in preparation for settling up.

The guts of the new system will be shared by the Merc and the New York Mercantile Exchange (NYMEX) to provide member firms with a common software interface to both exchanges, saving infrastructure, systems and maintenance costs. Members will be able to install workstations in their own offices that access their accounts on both exchanges in real time through a PC environment. Eventually, members will be able to settle accounts with the Merc's Clearing House from their offices in London or Tokyo as the sun moves around the world each day.

Flexibility is at the heart of the new system. Using Information Engineering Facility, Texas Instruments Inc.'s CASE tool,composer, Kelly's team designed the system to run on disparate platforms. It can also be scaled down to run on smaller platforms, like Unix-based systems, just in case other, smaller exchanges—especially those in the developing world—want to buy a ready-made clearinghouse system. More important, its modular design allows the system to be expanded quickly and easily when complex new trading products come on the market. A financial-services data model developed by SEER Technologies Inc. will handle the next generation of currency futures, for example. "Most of the vanilla products have already been developed in our industry," says Meyer, "so new products are frequently completely different from what [we're used to]. In the past, we've needed a year or 18 months to get ready for a major innovation. Now we think we'll be able to do it in three or four."

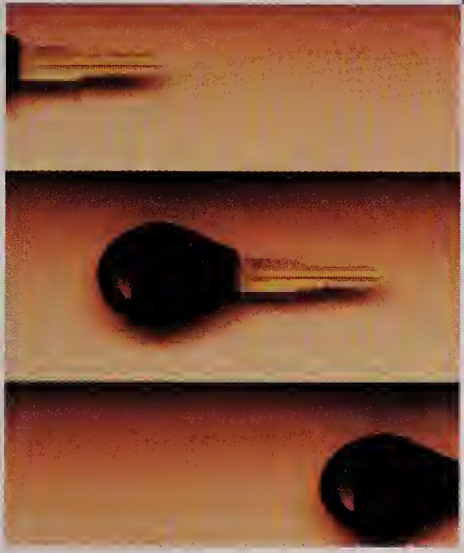
Partly due to the sheer importance and scope of the project, Meyer has moved two of her employees into Kelly's IS department for the duration of the project, which should be completed later this year and rolled out in early 1996. "The days of telling IS what we need and then waiting for it to happen have changed," she says. "We truly have a matrix structure where task forces are working on various modules of the project and we, the business users, are integrated into those teams from design through testing. It has allowed us to notice when things are missing or when we've failed to adequately describe what we need much sooner." And it helps Kelly keep to his budget and timeline.

Kelly, Meyer and Serpico have an easy rapport with one another, but that alone doesn't create award-winning partnerships. Rather, each understands what the others need, and how to provide it. "The key for the Clearing House is risk management," Meyer says, "and IS has given me the best risk-management system in the world." CIO

Legacy Renewal

Object Orientation

Enterprise Integration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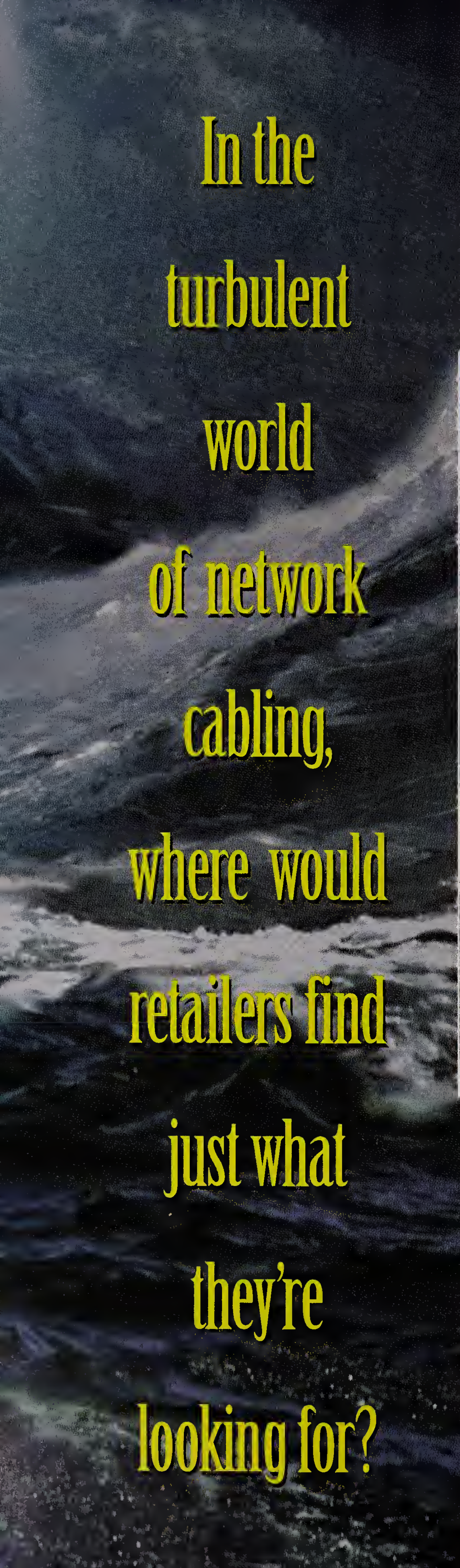

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THE Object-Oriented Express

Object technology has long been promoted as the solution to all IT problems. Organizations using the technology are finding that, while it isn't without its risks, object can indeed offer great rewards.

BY JOHN EDWARDS

PHOTO BY GEORGE SIMIAN

FOR ALL THE FANFARE IT HAS RECEIVED, ONE MIGHT THINK object technology is the miracle cure-all we've been waiting for. It isn't, of course, any more than any other single technology, lavishly promoted or not, has ever been a panacea. Nevertheless, where there's hype there's usually at least a kernel of truth, particularly when the technology in question proceeds to take over vast segments of its market and win a steadily increasing number of users. So it is with object: The software market now includes a broad array of object-oriented development products, languages, drawing tools, operating systems, editors and graphical user interfaces (GUIs), and organizations are increasingly using the technology in a variety of ways (see chart, Page 80).

Indeed, the growing move toward object technology is relatively easy to understand since, for most developers and their managers, it does make life simpler and generally more painfree. Object-oriented programming allows software to be built

ALAN NUGENT: *At Xerox, object technology is being used to link the IS strategy to business goals.*

from interchangeable parts; reusing code modules eliminates duplication and can greatly simplify software maintenance. In addition, object technology allows developers to hide the details of a program's operation from end users, making things easier for the employees who must actually use the software.

"[Managers] are planning to double, and in some cases even triple, the number of pilot applications using object-oriented technology by the end of this year," says Kathy Auerbach, a senior analyst at Sentry Market Research in Westborough, Mass. "The benefits of object-oriented technology—the rapid development of distributed applications, component reuse and easier maintenance—have become tangible to application developers under the gun to meet the time-to-market demands of their businesses," she adds.

"Object technology has come a long way in a remarkably short period of time," observes Bill Hoffman, president of Object World, a subsidiary of the Object Management Group, a Framingham, Mass.-based industry organization that establishes standards for the field. According to Hoffman, IS is at something of a crossroads, with many organizations considering object technology as a way of escaping their current patchwork quilt of multiple operating systems and hardware platforms. Object-oriented technology allows organizations to focus on a single way of developing applications, since the technology spans virtually all platforms. "There's no doubt that many managers are looking at object technology as a way of escaping their current mess," he says. "For many organizations, the question is whether to continue to muddle through with what they've got now or to take the plunge into object technology with all the risks any new venture entails."

AT AT&T MICROELECTRONICS, JOE DiSabato, manager for the Sales and Marketing Systems Integration department in Berkeley Heights, N.J., is using object technology to help the production control group get new chip designs into production. In 1993, he began to search for a tool to develop an application that could safely eliminate some of the tedious steps in the data collection process needed for decision support. The application had to run against several databases, with Oracle as the "home" database along with Oracle and Informix remote databases. The solution also had to support both character-based and GUI systems (including Windows), as well as run on multiple platforms, including GIS and Sun Server systems.

JOE DiSABATO *of AT&T Microelectronics: "No other environment would allow us to cover so many platforms."*

PHOTO BY EDWARD SANTALONE

The application development product DiSabato eventually selected, InSync Software Corp.'s Passport, combines an object-oriented fourth-generation language (4GL) with a development toolset. "Considering the scope of the project, object was the only way to go," he says. "No other environment would allow us to cover so many platforms." Besides simplifying development and maintenance, DiSabato says object technology also offers protection against obsolescence. "Object is the way things are headed," he explains. "By using object technology, I feel that we're really buying into the wave of the future."

DiSabato points to object technology's ability to let developers create usable code without having to understand all of the intricacies of the database or platform architecture. A developer can move an application to a different platform, for example, without touching any of the existing client/server code. "That's a big advantage when dealing with a multiplatform environment," he says.

In recent years, the object field has been hurt by a lack of reliable standards, particularly in the area of object request brokers (ORBs), which dictate how objects are defined, located and manipulated across a network. But with the recent release of the Object Management Group-sanctioned Common Object Request Broker Architecture standard known as CORBA 2.0, users can now safely define their applications and databases as objects, as well as bridge different development languages and operating systems. Object databases, relational databases and legacy flat files can all now be "wrapped" and contained as CORBA objects.

A remaining significant standards gap is compatibility between CORBA and Microsoft Corp.'s Object Linking and Embedding (OLE). Desktop applications typically use the Windows-based OLE object

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specification, while most other platforms use CORBA as their object model. Making sure there's a standard way to bridge the gap between the two object architectures is a high priority for many developers so that desktop applications can access business objects residing on servers. Several firms, including Iona Technologies Ltd., SunSoft Inc., Digital Equipment Corp. and Expersoft Corp., are working on products to link CORBA and OLE. Expersoft's PowerBroker 4.0, for example, delivers CORBA 1.0 and 2.0, OLE 2.0, Visual Basic, Smalltalk and C++ interoperability. Many of the new CORBA-OLE tools are expected to reach the market during late 1995 and 1996. A standard uniting the CORBA and OLE worlds is expected roughly within a year or two.

J. Bradford Kain, CEO of Quoin Inc., a Cambridge, Mass.-based object technology consulting and training company, says that embracing object technology usually means making a large immediate investment for gains that may not be realized right away.

"The real story about object is creating long-term benefits by improving the development process. And that's sometimes a tough sell," he says. According to Kain, a switch to the technology, even on a modest scale, can be difficult for managers to justify to top management without a careful, detailed explanation of the long-term goals. "Often an initial object technology project will cost more and take longer than with traditional development methods. That's upsetting, and it's hard to convince people that it's important to move to the new technology."

Kain notes that object presents IT professionals at all levels with a significant learning curve that must be conquered before any benefits can be obtained. (See "Shared Objectives," *CIO*, March 1, 1995.) "There are a lot of tools, new techniques and new ways of thinking about the development process," he says. Regarding the latter, "with object technology, there's more emphasis on analysis and design," he says. "As a result, the distribution of effort is front-loaded."

TONY GREENING *of Leaseline: Object technology allows IS staff to focus on real-world problems instead of software snafus.*

PHOTO BY JON MURESAN

For Leaseline Financial Inc., a leasing company in Birmingham, Mich., object-based imaging technology was the key to helping employees keep track of the thousands of leases in Leaseline's portfolio. "We found that under the old system, contention for files was becoming a real problem: not knowing where they were, who had them," explains Tony Greening, a financial analyst for the firm with responsibility for IT management. Greening's staff found a solution by tapping object-oriented programming to create an object-based imaging environment that uses the metaphor of paper-based files.

Leaseline used Visual Basic as its development platform. The final application runs on a Novell NetWare LAN, and the documents themselves are stored on CD-ROMs. Greening says he selected Visual Basic over C++, Smalltalk and other competing languages because of its relative ease of use and the wide availability of toolkits and other resources. "You can't get much simpler than Basic, and finding support tools is no problem at all," he says. Although some say Visual Basic lacks some of the flexibility of other object-oriented languages and has been criticized for being somewhat klunky, Greening says it was more than adequate for the task.

The biggest problem Greening faced in implementing the system was getting a handle on the bottom-line benefits the technology would offer. He notes that the advantages offered by object technology are just too nebulous to quantify in terms of money saved. "You can't say, 'I've saved X dollars,'" he explains. "You can make an educated guess, but that's about it."

The technology has provided usability and productivity benefits for both developers and end users at Leaseline. "It has had a beneficial impact on the whole company. If a current customer requests another lease, we can grab a lot of the information right out of the old account rather than repeat the entire application process." For programmers, object technology has streamlined the development process, allowing staffers to concentrate on solving real-world problems instead of software snafus. With its common language and consistent set of tools, object has also helped to lower Leaseline's developer training costs, Greening says.

WHILE USING OBJECT TECHNOLOGY in individual applications or areas is relatively common, Xerox Corp. has embraced the technology on a larger scale. According to Alan F. Nugent, executive vice president of Xerox's global process and information management team in Rochester, N.Y., the company has embarked on an enterprisewide

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COMPLEMENTARY OBJECTIVES

479 attendees at the August 1995 Object World trade show describe their organizations' use of object technology

What are your three top reasons for moving to object technology?

Improve programmer productivity	**36%**
Increase software reuse	**36%**
Reduce time to market	**33%**
Enhance software quality	**33%**
Respond to changing user requirements	**32%**
Reduce maintenance costs	**25%**
Distribute data/applications to all users	**18%**
Achieve cost savings	**16%**
Reengineer legacy applications	**15%**
Improve application ease of use	**12%**
Increase end-user productivity	**11%**
Reduce application development backlog	**8%**
Other	**5%**

How are object-oriented applications used in your organization?

Information retrieval/reporting	**51%**
Online transaction processing	**33%**
Decision support	**29%**
Modeling/simulation	**28%**
Office automation/ personal productivity/groupware	**25%**
Scientific/engineering	**25%**
Real-time process control	**24%**
Batch transaction processing	**15%**
Other	**21%**

Which object-oriented languages are you actively using?

C++	**77%**
Smalltalk	**28%**
Objective C	**22%**
OO COBOL	**6%**
OO Pascal	**6%**
Eiffel	**4%**
Common Lisp Object System (CLOS)	**3%**
Other	**20%**

SOURCE: MARKET PERSPECTIVES INC., FRAMINGHAM, MASS.

shift to object, despite the risks that might involve. "We're in the process of moving from a traditional Cobol-focused mainframe shop to a distributed-object, client/server operation," he says. "We're completely reengineering the way we deliver information technology to our businesses. We're into object hook, line and sinker—feet first."

Xerox is tackling object from multiple directions—as an in-house development technique and in end-user application development. All of the company's object projects are rooted in a fundamental shift made by the company's top management two years ago, Nugent says. In 1993, Xerox moved to bring its information management operations up to speed by undertaking an initiative called IM 2000. One of the first steps in the restructuring was to outsource the operation, enhancements and maintenance of all legacy systems to EDS. That step allowed Xerox to move forward with new information approaches and architectures, and object technology was identified as a critical success factor in the strategy. The technology is being used to link the firm's business strategies with its information strategy, allowing Xerox to design and deliver process-driven applications that closely match the roles and responsibilities of people within the organization.

Nugent's aim is to design a "workflow-enabled" business in which Xerox's workers always have access to the information they need to fulfill their responsibilities. So far, the delivery teams have developed several workflow-enabled applications for business processes, including expense tracking and reimbursement.

According to Nugent, object-oriented development tools—primarily Rational's Rational Rose, Forte Software Inc.'s Forte Software suite and PowerSoft Corp.'s PowerBuilder—help his developers create applications that meet IM 2000's goals. Xerox and Rational developed a round-trip engineering capability between PowerBuilder and Rose to create an environment for building high-end client/server applications. This combination of an object-oriented analysis and design tool and an object-oriented application-development environment provides an opportunity for developers to respond rapidly to customer requirements. Nugent says the products are relatively easy to use and provide a high level of integration between the relational world and the object world.

One of the biggest challenges Nugent says he has faced since joining Xerox a year and a half ago has been training the company's developers in the ways of object. Despite the use of Rational Rose, Forte and PowerBuilder, the task has been formidable, exacerbated by aggressive delivery schedules and a shifting industry landscape. "We have a situation where some people are very familiar with the technology, some are familiar with it in only a particular domain and others are less knowledgeable about object in general," he says. Xerox's situation has been made more problematic by the information management center's location in upstate New York.

To bring its development operation up to speed on object technology, Xerox has opened a satellite office in Boston to take advantage of the local talent base. "We really don't need people to be in the same facility in order to get the productivity benefits we would like to see," says Nugent. Xerox also operates development sites in Colorado and California. "Once you pull the geographic boundaries off, it's pretty easy to find talent," he says.

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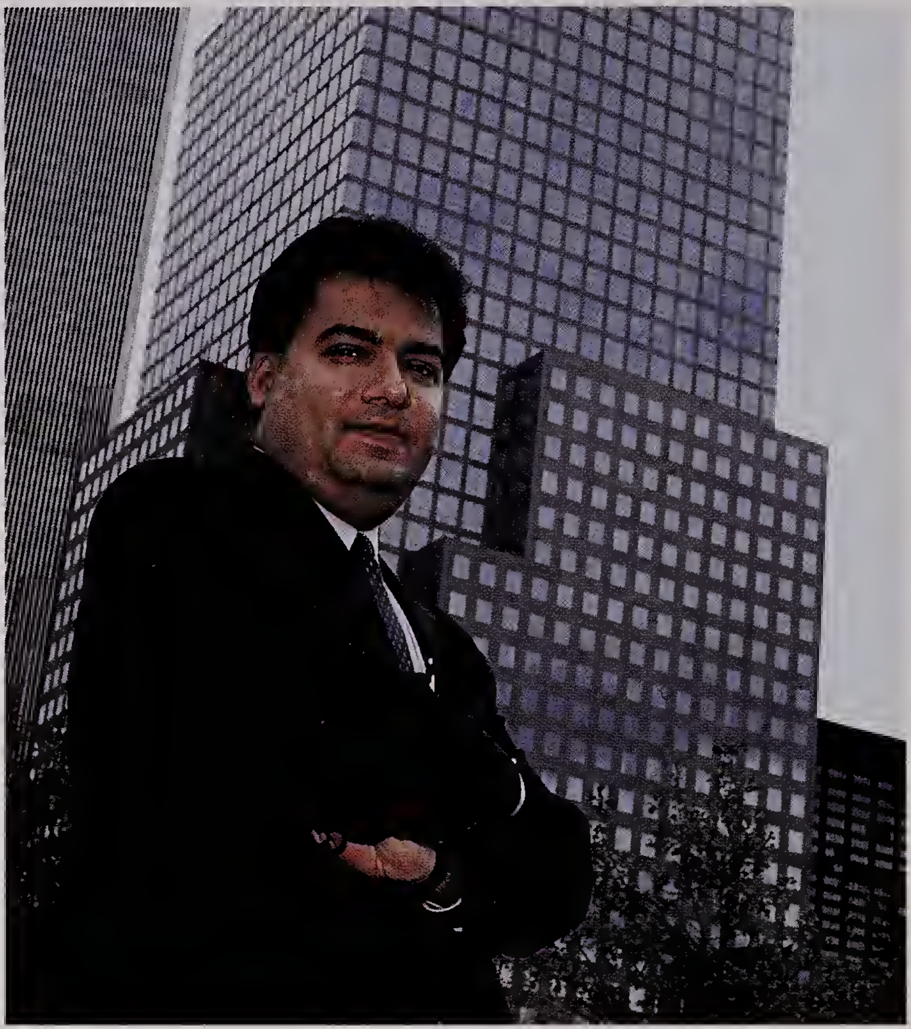
ence in the object development field can be harder to come by. Sanjeev Shah, a software development consultant with Fuji Capital Markets Corp., the New York-based subsidiary of Japan's Fuji Bank Corp., says that although a programmer may have experience in object technology and an object-oriented language, it may not be the right kind of experience. "The object technology field is so widespread that it's impossible to find someone with experience in all areas or even a particular area," he says.



SANJEEV SHAH *of Fuji Capital Markets: "Object has made everything much simpler, since we can focus on what needs to be accomplished rather than worrying about compatibility issues."*

PHOTO BY ARNOLD ADLER

Two years ago, Fuji Capital Markets switched to object-oriented programming to establish a 24-hour global portfolio-management network linking its London, New York and Hong Kong offices and functioning as a trading system for financial derivatives. Shah used Visix Software Inc.'s Galaxy Application Environment to create the network's point-and-click navigation system. With Galaxy, developers can write a scaleable, distributed application that operates across multiple environments—including, in Fuji's case, Sun Microsystems Inc.'s Sun OS and Solaris—without changing any code among the platforms. "Object has made everything much simpler, since we can focus on what needs to be accomplished rather than worrying about compatibility issues," Shah says, adding that the technology has streamlined his shop's operations, allowing a single developer to do the work of two or three programmers concentrating on separate platforms.

Other key advantages provided through Galaxy are reusable objects and rapid GUI development and enhancement without recompiling, he says. In addition, the system offers a shortened learning curve, with one application programming interface (API) for operating systems and distributed services for all platforms. The result, he says, was that his staff experienced no significant technical difficulties in making the switch to object technology. "We had no major problems. Everything more or less went as planned and the advantages generally lived up to their promise."

Still, finding capable object programmers remains a concern for Shah. "People who know C++ generally have no difficulty adapting to one or another object development product," he says. But locating developers who are knowledgeable about both object technology and networks is another story. "Such people can be hard to find. It's not a major problem, but it's something we have to deal with."

Nevertheless, Viktor Ohnjec, the director of technical services for Semaphore, a North Andover, Mass., object technology training and consulting firm, says many companies moving into object technology make too big an issue out of finding or retraining developers. "People who are really gifted at what they do can probably take any language or any technology and make it work. They'll have a tougher time with certain things than others, but it's really their knowledge that makes a project succeed, not the technology they use."

WHILE THERE'S LITtle doubt that companies using object today are reaping significant rewards, managers considering adopting the technology for themselves should still proceed carefully. Since object is such a broad field, different segments of the market are maturing at different rates, cautions Adrian Bowles, managing director of Atelier, an object technology research and consulting firm in Westport, Conn. "It all depends on whether you're looking at programming, the analysis and design of information systems, object-oriented databases or whatever. These are all at different levels of maturity and the risks on embarking on a project in one of these areas depends on the exact nature of the project," he says.

For example, object request brokers are still fairly new, and there's some question whether CORBA technology will be pushed out of the market by OLE. On the other hand, an object-oriented programming language like Smalltalk has been around for many years and presents relatively little risk to its users.

"You have to do your homework," notes Bowles. "This isn't a field you can head into unprepared."

John Edwards (70007.412@compuserve.com) *is a freelance writer based in Mount Laurel, N.J.*

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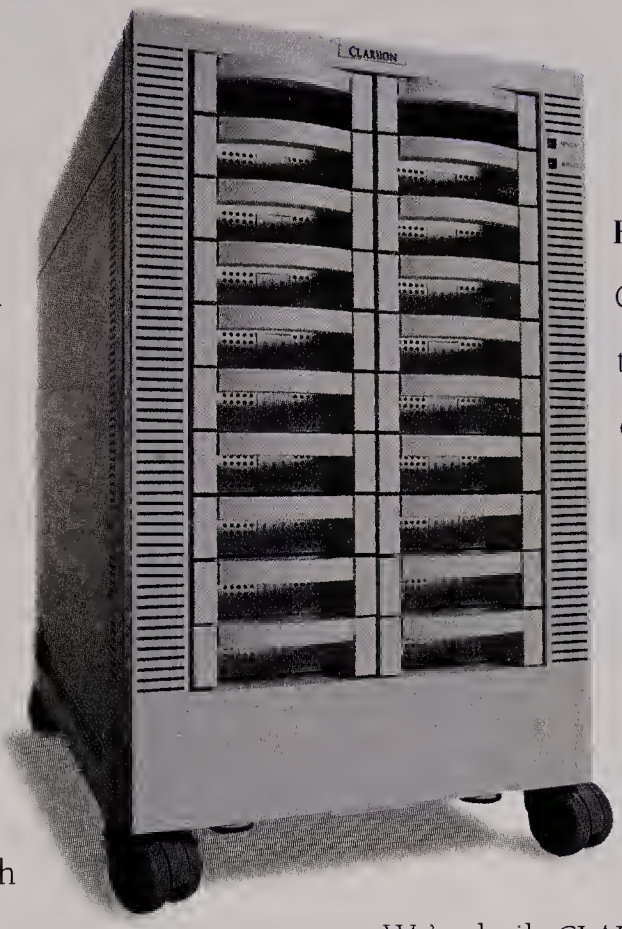

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Gartner View: Think Local, Control Global

Enterprise LAN costs are spiraling out of control, and IS is in the hot seat again. It's time to bring some method to the madness.

BY DAVID CAPPUCCIO

The rise of client/server computing in the strategic enterprise IT architecture has caused IS executives some sleepless nights. LAN costs are through the roof, and support is often a joke. But new models are emerging to help organizations determine the total cost of the enterprise LAN environment, better understand (and therefore minimize) the individual LAN cost elements and provide cost-effective LAN support in distributed computing environments.

One of the most painful truths to emerge from the distributed computing model of the 1990s is that support costs have escalated well past anyone's expectations. IS organizations must reassess enterprisewide IT spending patterns and reinvent financial management practices, keeping a sharp focus on the costs of LAN ownership.

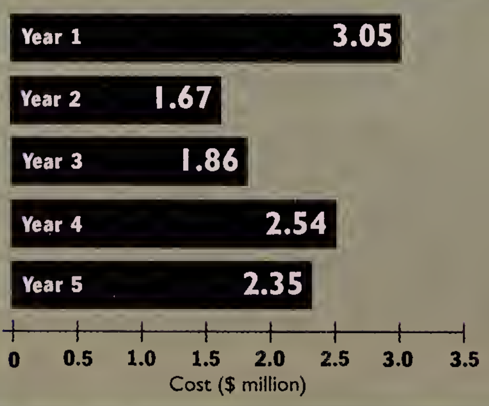
Gartner Group's corporate LAN cost-of-ownership model is updated on a regular basis to reflect the estimated cost and resource requirements for midsize LAN environments. The model estimates that a 700-user LAN environment has an average annual cost of $2.3 million, which equates to an annual cost of $3,275 per LAN user (see Figure 1). The model also shows that 73 percent of total LAN costs are for personnel resources—connectivity administration, network operating system (NOS) and application support, and hidden costs.

These figures are based on the prevailing organizational support structure within enterprises—namely, where most support personnel are deployed at the LAN sites instead of at a central site. Significant cost savings can be achieved by centralizing certain support functions.

Companies are finding that hidden costs can be as much as 24 percent of the entire IS budget. These costs will continue to increase until support functions are managed down to the desktop level. A leading hidden-cost category for enterprise LANs is the overhead for employees who perform work that is outside their official job responsibilities—for example, when end users request technical assistance from co-workers instead of calling the help desk. IS organizations must assume the responsibility for fixing this problem, which is generally brought on by understaffing the support function.

FIGURE 1: **LAN Ownership Costs**

AVERAGE ANNUAL COST FOR 700 USERS: $2.3 MILLION



BREAKDOWN OF THE AVERAGE ANNUAL COST PER USER

Capital		
Components	$873	27%
Labor		
Connectivity Administration	$412	13%
NOS/Application Support	$1,099	33%
Hidden Costs	$891	27%
Total	$3,275	100%

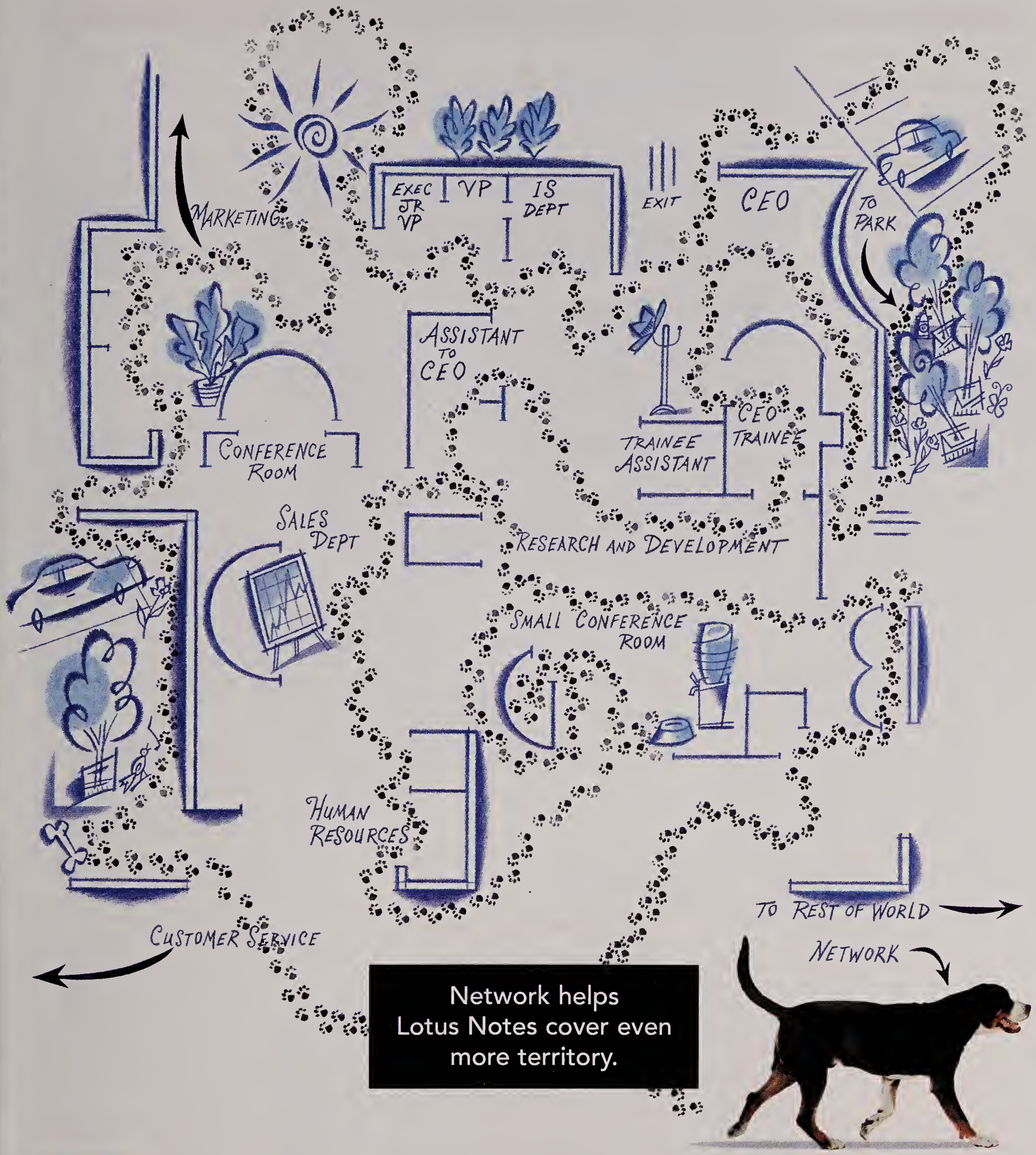
Traditional paradigms for solving this problem are not cost-effective, and newer support models must be developed. Many sites will attempt to develop network support organizations that are flexible enough to accommodate the high growth rates of network computing while still providing business-focused support. All this must be done while maintaining a tight rein on overall budgets and personnel head counts.

A sound LAN cost model can help managers drive down costs line item by line item while maintaining a predetermined quality level—a procedure comparable with what a manufacturing facility does in using its product-specific cost breakdowns. In the area of physical connectivity, personnel savings can be attained by using intelligent hub products, which ease the management and configuration burdens. The most important cost items to watch, however, are those related to network services (e.g., NOS-based) and application support, where costs will rise considerably as the application and system complexity of corporate LANs increase.

LAN Server Consolidation Cost Savings

A dramatic increase in IS executive interest has developed about the merits of consolidating multiple LAN servers into large, centrally managed servers. There are two reasons for the heightened interest:

- The number of servers and network change requests



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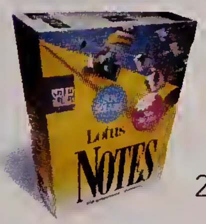

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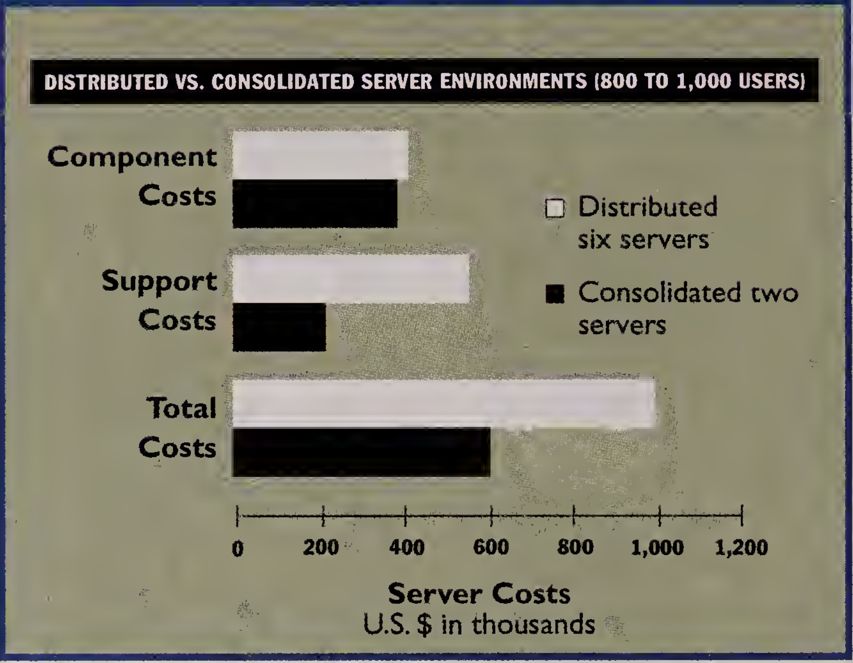
in many environments has become unmanageable. Many companies are looking to reduce the complexity through centralization.

- Signature authority for servers and other LAN components is moving away from departmental managers to central IS management areas as the price of these items escalates. IS managers are used to a more centralized approach in dealing with hardware and staff, and they are seeking ways to reduce costs and improve service while establishing some control over distributed environments.

FIGURE 2: Three-Year Costs



Gartner Group has developed a model to help IS executives understand the financial benefits of moving from many small distributed servers to larger consolidated servers. This model compares component costs and personnel support costs for both environments and projects the savings achievable.

In an analysis of a six-server distributed environment moving to a two-server consolidated environment (see Figure 2), we assumed 800 to 1,000 users. The feasibility of implementing the model's level of consolidation is based on many factors, including bandwidth, NOS, response-time goals, application diversification, support structure and the political climate within an organization. The political climate might be the most crucial factor, since wresting control of a department's LAN can be a daunting task.

The model's results project total component and support costs for the distributed and consolidated environments over a three-year period. Traditionally, Gartner Group uses five-year life-cycle costs, but in today's LAN environments, few components—with the exception of building wiring—are viable after three years. Only two components are more expensive in a consolidated environment: the server and vendor maintenance.

The six-server to two-server consolidation results in impressive cost savings over three years:

- The overall cost drops by almost 38 percent, from $997,688 to $623,190—a savings of $374,498.
- Component costs are cut $33,347, almost 8 percent.

The range of application environments that must be understood by one support group is often the biggest impediment to a centralized support approach.

- Support costs are slashed $341,151, almost 60 percent. The largest support cost reduction areas are storage management and backup services, which together yield a $185,472 savings.

In a significantly larger server consolidation—moving from 32 distributed servers to six consolidated servers—the three-year savings total more than $3 million. A server consolidation of this magnitude may be an aggressive move for some organizations, but many small departmental servers are severely underutilized and are prime targets for consolidation. Still, the consolidation decision cannot be made lightly, since the relocation of resources may have a profound impact on either the underlying networking infrastructure or predefined customer service-level agreements.

Centralized vs. Decentralized Support

In many enterprises, the range of application environments that must be understood by one support group is often the biggest impediment to a centralized support approach. Knowledge of end-user applications is critical inasmuch as most calls to a central help desk pertain to application use as opposed to technical problems that require fault isolation and the restoring of service.

However, the number of applications varies greatly by industry type. In a retail banking environment, for example, every branch-office LAN supports the same local or enterprisewide applications, which is an ideal situation for centralized management. On the other hand, a manufacturing company has a multitude of different applications—few common applications can be spread across sales offices, engineering departments, manufacturing facilities and corporate headquarters. This situation makes it nearly impossible for centralized staff to understand, track and support all applications.

Consequently, vertical industries such as banking, insurance, retailing and transportation are better suited for centralized LAN management than are government agencies or aerospace and manufacturing industries, although the latter group can be addressed successfully with hybrid support solutions.

A Hybrid Approach

Although centralized LAN support is clearly desirable, the diverse requirements of many enterprises sug-

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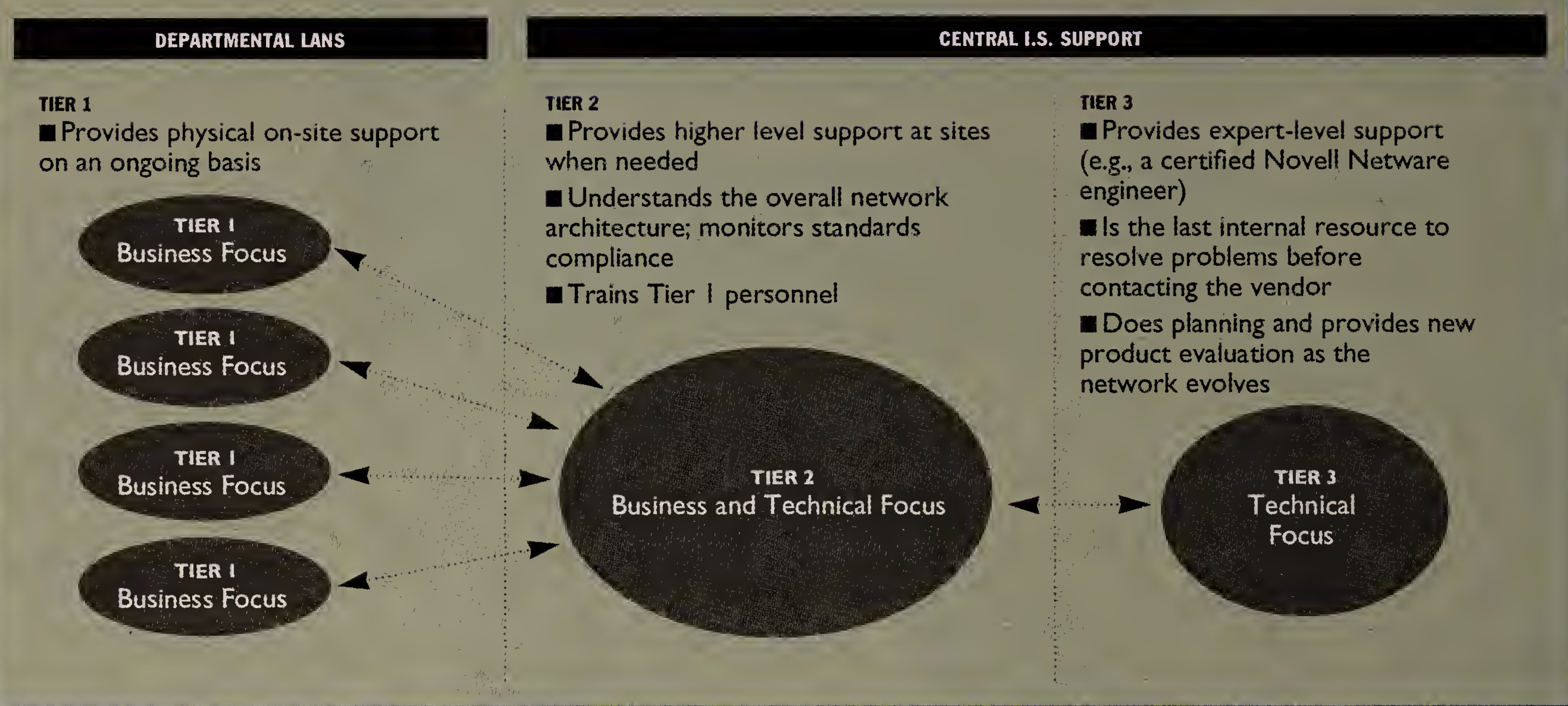
FIGURE 3: Hybrid Support Structure



TIER 1
- Provides physical on-site support on an ongoing basis

TIER 2
- Provides higher level support at sites when needed
- Understands the overall network architecture; monitors standards compliance
- Trains Tier 1 personnel

TIER 3
- Provides expert-level support (e.g., a certified Novell Netware engineer)
- Is the last internal resource to resolve problems before contacting the vendor
- Does planning and provides new product evaluation as the network evolves

gest the need for a combination of central and on-site support (see Figure 3). The focus of this structure must be one that takes the business customers' perspective. Given the difficulty of wresting control of on-site support functions from independent departmental managers in many organizations, service-level agreements should be established and strictly adhered to if the hybrid structure is to succeed. Typical elements of a service-level agreement include network response-time goals, repair-time objectives, network availability targets, audit and reporting procedural specifications, escalation process definition, and the specification of roles and responsibilities. In many cases, outsourced support agreements fail because the focus is on providing technical solutions to end users rather than on solutions to business problems.

As support structures are streamlined, the help desk, already pivotal in many enterprises, will become even more important. Centralized or hybrid LAN support structures will fail without a distributed, scalable help desk structure in place. These structures will rely on common databases that allow any authorized user to open trouble tickets, and Tier 1 support to business users will be delivered at the LAN sites. (Tier 1 support personnel are often assigned this responsibility by the departmental manager when the LANs are first installed; in most cases, they are an integral part of the business unit.)

Handing off trouble tickets between subsequent tiers improves overall responsiveness and ensures continuity between various support organizations. Help desks that rely on a central phone number risk alienating users as workloads increase because response times will also increase. However, if this is your only current option, expert-system-based technology can make it work more effectively.

Expert-system technology is being successfully applied in a wide range of applications that focus on the following: evaluation and diagnosis, design and configuration, classification and prediction, planning and scheduling, and text and language processing. The automated help desk is one such application. An expert system collects descriptions of symptoms or problems from IT users, asks questions to get further information and retrieves matching case histories to provide guidance.

Inadequate LAN support can lead to numerous operational inefficiencies and even LAN downtime, which can be exceedingly expensive for many enterprises, sometimes running into millions of dollars. As mission-critical applications are developed for distributed LAN environments, the performance, reliability, availability and serviceability metrics commonly reserved for computer center environments will take on much greater importance from the overall business and IS support perspectives. CIO

EDITOR'S NOTE: *With this look at the costs of enterprise LANs, we continue a series of briefings authored by Gartner Group on what CIOs should know and do about assorted technology developments. We look forward to hearing what you think about this new column. Please contact* CIO *Editor Abbie Lundberg at 508 935-4731 or* lundberg@cio.com.

David Cappuccio, vice president and research director of Gartner Group Inc.'s networking technologies and strategies, can be reached at 203 316-1111.

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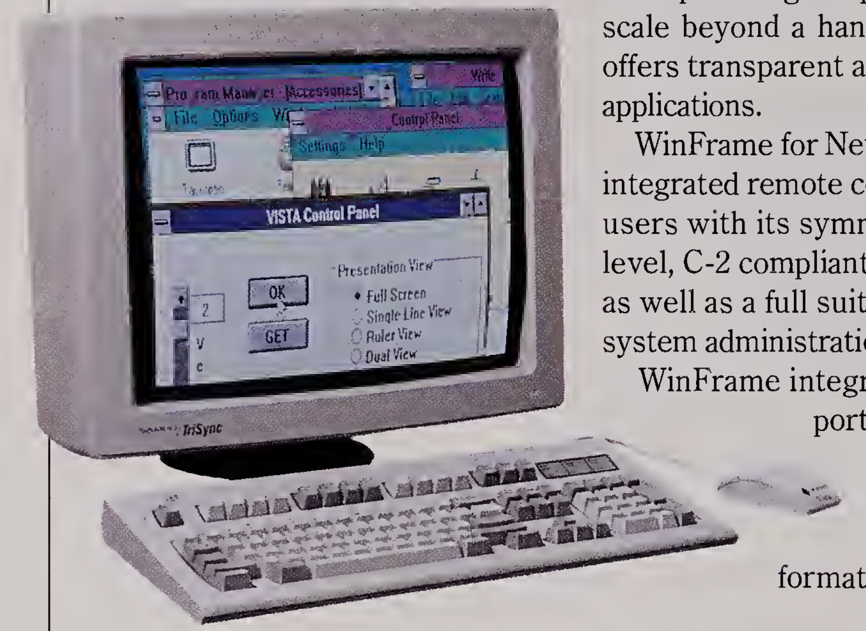
The Big Picture

Millions of people have some degree of vision problems, ranging from minor visual impairment to total blindness.

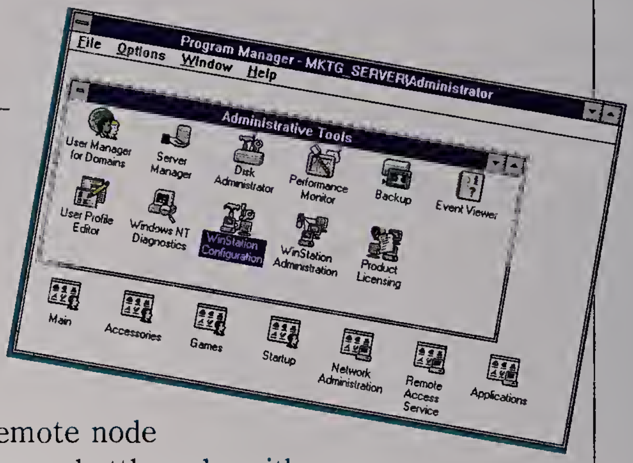


TeleSensory of Mountain View, Calif., offers low-vision desktop reading devices that combine a closed-circuit television camera, monitor, lens and high-intensity illumination, to let the user magnify, increase contrast and improve the field of view of just about anything—photos, textbooks, maps or catalogs.

VoyagerXL's large black-and-white display screen provides magnification of up to 60 times. Its Automated Viewing Table option allows hands-free viewing, and table movement can be controlled by a foot pedal or joystick. Chroma, the full-color version, is available with a 14- or 20-inch monitor, and can work with VGA and SVGA monitors as well.

TeleSensory also offers Vista, a system that allows a person with low vision to magnify text and graphics on the computer screen up to 16 times. Vista has screen navigation and cursor tracking and is compatible with networks and terminal emulation. Contact TeleSensory for more information at 415 960-0920.

Looking at Remote Areas



Remote node. Remote control. Until now, organizations were forced to choose between these two technologies to solve complicated remote computing problems. But neither can single-handedly address all the remote computing requirements of the enterprise. Remote control, while providing adequate performance, does not scale beyond a handful of remote users. And remote node offers transparent access but may cause performance bottlenecks with some applications.

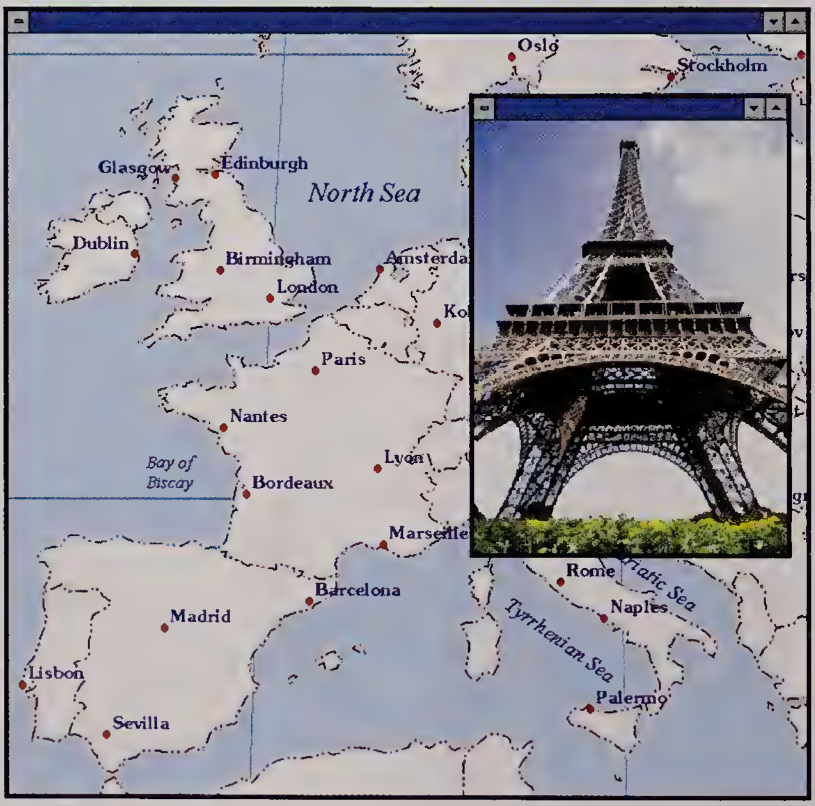
WinFrame for Networks from Citrix Systems Inc. combines both technologies in a single integrated remote computing platform that scales to accommodate hundreds of concurrent users with its symmetrical multiprocessing platform support. It includes a set of multilevel, C-2 compliant security features, such as secured authentication and data encryption, as well as a full suite of end-to-end Windows-based management utilities that permit full-system administration from any local or remote PC.

WinFrame integrates with both Microsoft NT and Novell NetWare networks and supports popular network protocols. The server accepts connections through standard telephone lines, wide-area network links or the Internet. It has a suggested retail price of $5,995 for 15 concurrent users. Additional users can be added in increments of 10 for $1,995. For more information, call 800 437-7503 or 305 755-0559.

On the Road Again

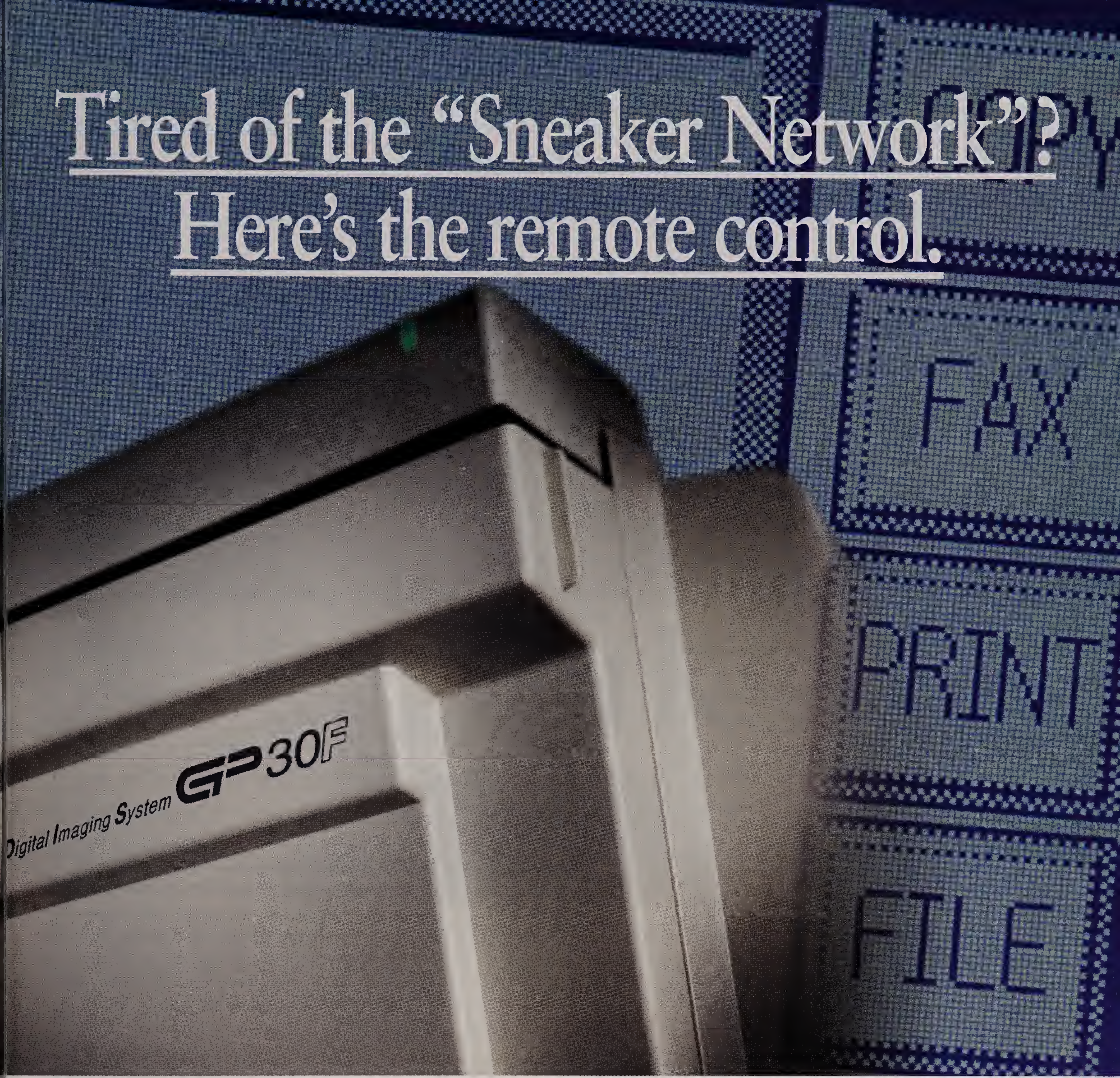
Now the world is literally at your fingertips. With Caliper Corp.'s Maptitude, a 32-bit desktop mapping and geographic information system (GIS) application for Windows, users can create inexpensive maps of, customer and sales data; identify the best business locations; calculate the shortest routes; and create presentations.

The complete package of software and data, priced at $395, includes automated mapping technology along with a host of other mapping tools. Maptitude contains maps of all the streets in the United States as well as ZIP codes, demographic statistics, and county and metro area information.



Maptitude is the first GIS to support Object Linking and Embedding 2.0, which allows maps to be "dragged and dropped" into documents. Using Open Database Connectivity, it can create virtual data tables that comprise data items from multiple heterogeneous sources.

Caliper's Maptitude requires a 486 or Pentium, 8MB of RAM, a CD-ROM drive and at least 16MB of free disk space. It can be installed on a file server, and any number of users can share access to geographic and tabular files in a client/server environment. Contact the Newton, Mass.-based company at 617 527-4700.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		I	II
A.	Total number of copies printed (net press run)	92,963	97,757
B.	Paid and/or requested circulation		
	1. Sales through dealers and carriers,street vendors and counter sales	0	0
	2. Mail subscriptions (paid and/or requested)	83,344	84,690
C.	Total paid and/or requested circulation (sum of B1 and B2)	83,344	84,690
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F.	Total free distribution (sum of D and E)	6,830	10,895
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H.	Copies not distributed		
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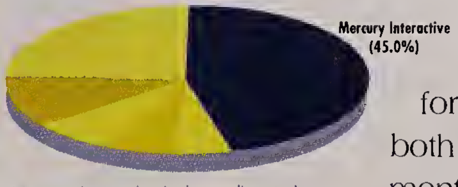

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ECKXCO

Hold the Invoices, Please

When a system that just works isn't enough

Change is difficult enough when it's necessary for survival, but what about when things work just fine without it?

In 1992, when Curtis Thompson became IS manager for PGL/Huttig Distribution, an Auburn, Wash.-based distributor of windows, doors and other millwork to U.S. hardware retailers, he quickly realized that the company's invoicing system was stuck in time. Antiquated band printers slowly tugged on an endless stack of paper invoices with more layers (four, to be exact) than a good deli sandwich. Next to the printers were de-leaving machines to pull all those layers apart and bursting machines to separate the invoices at the perforations. Two copies of each of the 1,200 or so daily invoices were then hand folded, stuffed into specially manufactured envelopes and delivered to the post office. Another was walked to an ever-growing bank of file drawers for storage and a fourth mailed to salespeople in the field.

The system sounds archaic, yet like so many things old, it worked. And while some of PGL/Huttig's larger retail customers occasionally sniffed about all that paper, its many mom-and-pop hardware customers didn't mind getting a little carbon on their fingers each month.

Thompson saw that he had to take it upon himself to shake things up. But he knew better than to lead with the technology. "The first thing I did was calmly sit down with our staff and say, 'Please help me understand why we need four parts for each invoice,'" says Thompson. "They were stymied. They couldn't come up with a reason why we shouldn't change it."

Thompson phased in changes gradually, consulting with affected staffers each step of the way. In August 1994, the four-part invoice went to two parts. In August 1995, the company moved to a single-page, plain-paper invoice and a paperless auto-faxing system for 12 customers who agreed to be part of a pilot test. By mid-September, more than 200 customers were taking advantage of auto faxing.

Thompson rewrote the mainframe code to convert the invoice template from a pre-printed to a self-contained format. Each evening, a database churns through the data on confirmed orders on a Sanyo/Icon mainframe and downloads invoicing information into a PC. The PC faxes invoices automatically to the auto-fax customers and prints a single copy of each invoice to be mailed to all other customers. If there's a transmission problem, a detailed fax log available to all internal users on the mainframe terminals will reveal the source. Employees have desktop online access to any invoice, whether faxed or printed, for six months; copies are also compressed and permanently stored in a PC-based data warehouse.

With auto faxing, invoices that languished in the mail for as many as eight days now arrive in a few hours, and faster billing means faster payment. Customer service personnel have easier access to invoice information and can resolve customer problems more quickly. The number of times that invoices are handled is reduced from six to one at each of the company's three locations, and the booming sound of metal file drawers slamming shut is becoming a distant memory. As the system is rolled out across the company this fall, up to 4,000 customers are expected to be added to the auto-faxing system. PGL/Huttig will save $1,000 per month on paper and even more on handling and mailing costs with the new system.

Thompson could have gone more high-tech than his $4,800 PC-based system. But he maintains that anything else—such as EDI, for example—would have been overkill, given that some smaller customers are still making do with rice-paper fax machines. Instead, Thompson plans to extend the savings from auto faxing into the realms of purchase orders and general communications.

–*Christopher Koch*

VITAL STATISTICS

Organization: *PGL/Huttig, Auburn, Wash.*

Application: *Automated facsimile transmission and tracking of invoices; data warehousing*

Sponsor: *Curtis Thompson, IS manager*

Technologies: *Pick Systems relational database on a Motorola-based Unix server accessed by a Pentium-based PC with a serial connection; EZ Image Inc.'s EZ Archive; Intuitive Technology Inc.'s FaxLink Gold*

Scope: *When fully rolled out, the system will serve 200 employees and 4,000 customers*

Objectives: *Speed invoice turnaround time to customers and streamline administrative handling costs*

Payoff: *Reduced overhead and administrative time, decreased turnaround time for invoices and customer payments, improved customer service, decreased on-site storage needs, improved information access*

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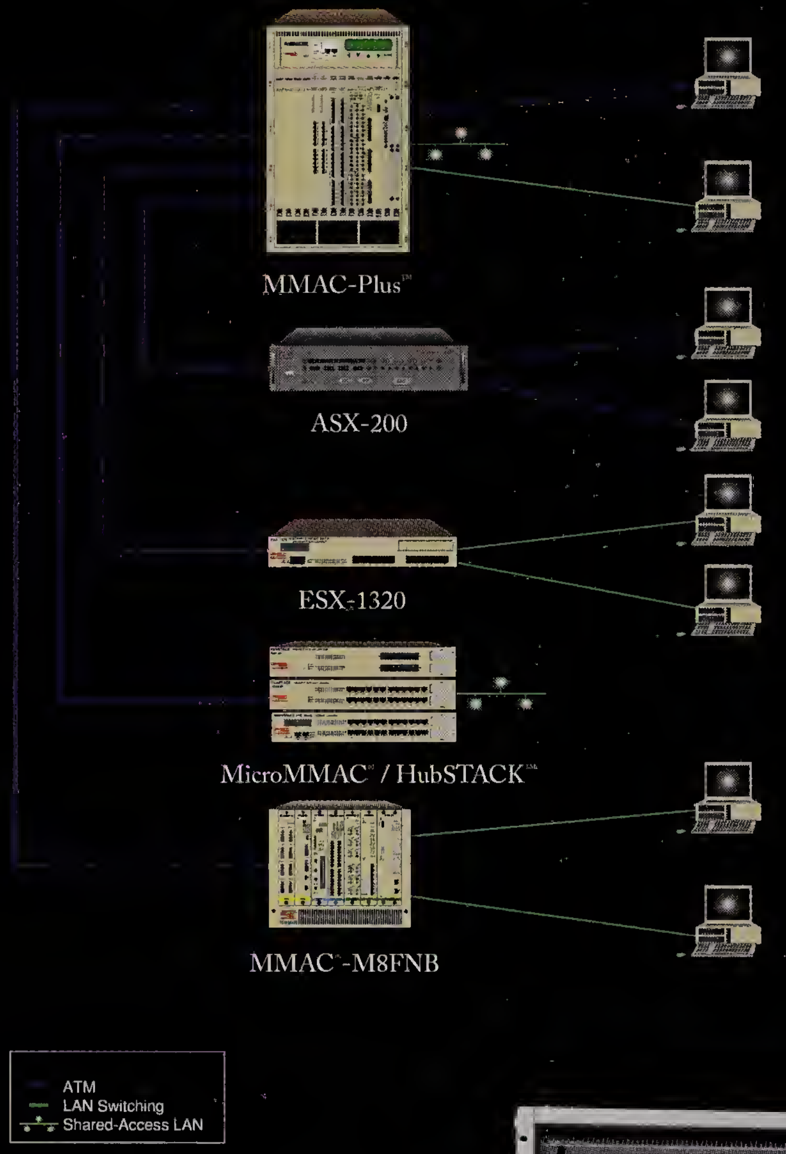

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